THE

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METERS REPAIRED AND FORWARDED WITH DISPATCH.

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ARRANGED BY STATES AND COUNTIES,

Shewing where Gas-Works and Water-Works are Wanted.

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3 Counties, 76 Towns, 3 Gas-Works, no Water-Works.

Kent County.

Arthursville, Camden, Canterbury, *Dover*, (c. h.,) Farmington, Felton Station, Frederica, Harrington, Hazletville, Hollyville, Kenton, Leipsic, Leipsic Station, Little Creek Landing, Magnolia, Marshy Hope Bridge, Masten's Corner, Milford, Smyrna, Vernon, Whiteleysburgh, Williamsville, Willow Grove.

New Castle County.

Blackbird, Centreville, Chippewa, Christiana, Claymont, Cooch's Bridge, Delaware City, Fieldsboro', Glasgow, Henry Clay Factory, Lovevtile, McClellandsville, McDonough, Mermaid, Middletown, Newark, *New Castle*, (c. h.,) New Port, Odessa, Pleasant Hill, Port Penn, Red Lion, Saint George's, Stanton, Summit Bridge, Talleyville, Townsend Station, *Wilmington*, (c. h.)

Sussex County.

Angola, Black Water, Bridgeville, Bull's Mills, Cannon's Ferry, Cedar Creek, Concord, Cove Dale, Dagsboro', Draw Bridge, Frankfort, *Georgetown*, (c. h.,) Gumborough, Hall's Store, Hollyvie, Horsey's ⋈ Roads, Laurel, Lewes, Middleford, Millsboro', Milton, St. Johnstown, Seaford, Selbyville, Tunnell's Store.

FLORIDA.

35 Counties, 166 Towns, 1 Gas-Works, no Water-Works.

Addison County.

Sandy Ford.

Alachua County.

Gainsville, Micanopy, Morrison's Mills, *Newnanville*, (c. h.,) Sikesville, Sugar Grove, Waldo.

Benton County.

Augusta, Homasassa.

Brevard County.

Indian River.

Calhoun County.

Long Cane, Ochesee.

Columbia County.

Barber's, Cherry Hill, Columbus, Durham, Ellisville, Huntsville, Ichetucknee, Lake City, Little River, New Boston, Newburgh, New River, Olustee, Palestine, Providence, St. Helena, Saint Louis, Spring Grove, Stark, Suwanne Shoals, Trail Bridge, Tustenuggee.

Dade County.

Miami.

Duval County.

Baldwin, Chesuwiska, Hibernia, *Jacksonville*, (c. h.,) Magnolia Mills, Mandarin, Mayport Mills, Middleburgh, Yellow Bluff.

Escambia County.

Pensacola, (c. h.) Warrington.

Franklin County.

Apalachicola.

Gadsden County.

Aspalaga, Chattahoochee, China Hill, Concord, Mount Pleasant, *Quincy*, (c. h.,) Rickoe's Bluff, Ridleysville.

Hamilton County.

Bellville, Jasper, Jennings, White Springs.

Hernando County.

Bay Port, Cedar Tree, Crystal River' Fort Dade, Fort Tyler, Munroe's Ferry, Pierceville.

Hillsborough County.

Alafia, Ichepuckesassa, Tampa.

Holmes County.

Cerro Gordo, Home Spring, Ponce de Leon.

Jackson County.

Campbelltown, Crowell, Greenwood, *Mariana*, (c. h.,) Millwood.

Jefferson County.

Beaseley, *Monticello*, (c. h.,) Walker's Mills, Waukeenah.

La Fayette County.

Fayetteville, McQueen, Old Town.

Leon County.

Bailey's Mill, Centreville, Chairas', Hodgeson's Distillery, Jackson's Bluff, Micosukee, *Tallahassee*, (c. h.)

Levy County.

Atsena Otie, Black Dirt, Clay Landing, Long Pond, Wekeiva.

Liberty County.

Blue Creek, Ridleysville,

Madison County.

Cherry Lake, Clifton, Finkholloway, Fort Hamilton, Hamburg, *Madison*, (c h.,) Moseley Hall, Sandy Ford.

Manatee County.

Manatee.

Marion County.

Camp Izard, Cottage, Flemington, Iola, Long Swamp, Ocola, Orange Lake, Orange Springs, Silver Springs, Wacahotie.

Monroe County.

Key West..

Nassau County.

Callahan, Fernandina, King's Ferry, Lewisville.

Orange County.

Hawkinsville, Jernigan, *Mellonville*, (c h.,) New Smyrna, Orlando.

Putnam County.

Fort Gates, George's Lake, Lake George, Palatka, Welaka.

Santa Rosa County.

Austinville, Ossa Hill, McLellanville, Milton.

St John's County.

Orange Mills, Picolata, *St. Augustine*, (c. h.)

Sumpter County.

Adamsville, Lake Griffin, Lake Harris, Mossy Grove, Palmyra, Pine Level, Sumpterville.

Volusia County.

Enterprise, Volusia.

Wakulla County.

Benhaden, Newport, Oil Works, St Marks, Shell Point, Sopchoppy.

Walton County.

Alaqua, Almirante, Douglassville, East River, Knox Hill, Uchee Anna.

Washington County.

Econfina, Orange Hill, St. Andrews Bay, Vernon.

ON THE LOSS OF LIGHT BY GLASS SHADES.

By William King, of Liverpool, and Prof. Verver, of Maestrect; with a note of additional experiments, by Frank H. Storer.

Under date of Feb. 24, 1860, Mr. King writes to the Editor of the *London Journal of Gas Lighting*, etc., (see vol. ix, p. 111,) as follows: "Sir,—Having recently tried some experiments for the purpose of ascertaining the amount of light lost by the use of various descriptions of glass shades, I thought that the results obtained might prove not uninteresting to some of your readers, more especially as it is a subject of practical importance, and does not seem to have attracted the notice which it deserves.

The following table exhibits the amount of light lost by the use of the various shades therein enumerated:—

Description of Shade.	*Loss of Light.*
Clear glass,	10·57 per cent.
Ground glass, (entire surface ground,)	29·48 "
Smooth opal,	52·83 "
Ground opal,	55·85 "
Ground opal, ornamented with painted figures, the figures intervening between the burner and the photometer screen,	73·98 "

As the large amount of light lost by the use of a clear glass shade excited some surprise, a sheet of common window glass was placed between the burner and the photometer screen, when it was found that 9·34 per cent. of the light was intercepted, thus confirming the result obtained by the employment of a shade of clear glass.

I may state that the shades were selected from a large number, and great pains were taken to obtain an average specimen of each kind."

It should be mentioned in passing, that Verver* had previously called attention to the subject in these words: "It is not necessary to surround the wicks [of platinum, placed in the flame of the 'water gas,'] with glass chimneys as is done with ordinary coal-gas; on the contrary it is preferable not to employ them, because the chimneys, no matter how well polished or how clean they may be, always absorb a considerable portion of the light which is produced. This loss (*deperdition*) was shown by the following experiment:—A burner with twelve jets, without any chimney, afforded an illuminating power of 6·75 candles; but on surrounding the wick with a clean and perfectly polished chimney, the illuminating power amounted only to 5·25 candles; it had consequently diminished 1·50 candles. *i. e.* 22 per cent." But, as Schilling† has already remarked, this experiment alone does not prove that the whole of the lost 22 per cent. was absorbed by the glass of the chimney, since the conditions under which the gas is consumed when a chimney is used must be entirely different from those which obtain when no chimney is employed.

Immediately after the arrival in this country of the journal containing Mr. King's note I was requested by Mr. W. W. Greenough, Agent of the Boston Gas-Light Co., to institute a series of comparative experiments upon this subject. Since the results of these experiments have, in the main, fully corroborated those of Mr. King, it seems but just to this gentlemen to give them publicity.

Instead of lamp shades, flat sheets of glass (ordinary window panes) six inches wide by eight inches high, were fitted to a rack of blackened wire, which was fastened to the photometer bar (100 inches long) at a distance of three feet from the gas-light.‡

The gas employed was prepared from the caking coal of Pictou, N. S., expressly for these experiments, and was contained in a special gas-holder. The "illuminating power" of this gas, when consumed from the Parliamentary Argand Burner§ at the rate of five cubic feet per hour—as in the following experiments—was equal to 16·00 candles, consuming 120 grains, by calculation, (in reality about 135 grains, as carefully determined by the balance in each case,) of spermaceti per hour.

The experiments were made in the blackened experimental chamber of the Boston Gas-Light Co., with the photometer (Bunsen's) which I am accustomed to employ in my daily tests of the gas furnished by the Company to the consumers, every precaution being taken to ensure accuracy. It may also be mentioned that none of the measurements (of the distances of the photometer from the standard candle) obtained by actual experiment were calculated—*i. e.*, reduced to their equivalents in candles—until the whole series of experiments was completed, and that no comparison of my own results among themselves or with those of Mr. King was made until each member of the table had been calculated as it stands below. Whatever the experiments may be worth, therefore, they have at least the merit of being entirely independent and wholly unbiassed.

Description of Glass.	*Thickness of Glass.*		*Loss of Light.*
Thick English plate	⅛ of an inch.		6·15 per cent.
Crystal plate	⅛ "		8·61 "
English crown	⅛ "		13·08 "
"Double English" window glass	⅛ "		9·39 "
"Double German"† "	⅛ "		13·00 "
"Single German"† "	1-16 "		4·27 "
Double German † ground‡	⅛ "		62·34 "
Single German † ground‡	1-16 "		65·75 "
Berkshire, (Mass.) ground	1·16 "		62·74 "
Berkshire enm'ld, i.e., ground only upon portions of its surface—small figure	1-16 "		51·23 "
"Orange-col'd" window glass	1-16 "		34·43 "
"Purple" " "	⅛ "	As used for	85·11 "
"Ruby" " "	1-16 "	church win-	89·62 "
"Green" " "	1 16 "	dows, &c.	81·95 "
A porcelain transparency, (Tyroleese Hunter,)	1-16 "	" - -	97·68 "

The term "loss of light" employed by Mr. King does not at first sight seem to be strictly appropriate, for a very considerable portion of the light not transmitted by a glass shade might be reflected against the walls of the apartment in which the lamp is burning, and thus aid in the general illumination of the room. The meaning which Mr. King attaches to the term is, however, so perfectly self evident that I have not hesitated to follow him in using it. For that matter, there can be no doubt but that the numbers given by us express as accurately as the circumstances of the case will admit, the actual diminution of the amount of light, falling, for example, upon the pages of a book held near to its source, which would be occasioned by the interposition of the shades enumerated in our tables.

Boston, April 20, 1860.

[We cannot doubt that the great loss of light proved by the experiments above given, is to be, in part at least, accounted for by the conversion of a portion of the light into heat—an effect perfectly in harmony with the theory of transverse vibrations, as applied to explain the phenomena of polarization of heat. On this theory, heat and light are different effects produced by one and the same cause, and they differ physically only in the rapidity and amplitude of their vibrations. The screen through which the vibrations of light are propagated serves to diminish first the rapidity of the vibrations requisite to produce the most refrangible rays, and in proportion as the transparency of the screen is diminished by any cause, inherent or superficial, this arrest becomes more and more complete. As the most rapid etherial vibrations have probably the least amplitude, we infer from analogy in sound-waves, that as waves of least intensity have the greatest amplitude, so with the luminiferous ether the extreme red has but little brilliancy. Hence the loss of light from polished screens is small compared with that observed in screens of opaline or roughened glass. It would be instructive to examine the spectrum obtained from a pencil of rays under each of the cases given, by means of a sulphid of carbon prism.

The subject of absorption of light by screens has long since been carefully examined by *Bouguer*.* By a photometric method essentially like Rumford's, Bouguer measured the loss of light in the beam of a candle compared with a flambeaux and also with the light of full moon, in passing through 16 thicknesses of common window glass having a united thickness of 21·43 millimetres = ·85 inch. The mean loss of light shown by these trials was as 247: 1, or 99 per cent. of the whole quantity.

Six plates of the purest mirror plate-glass having an united thickness of 15·128 millimetres diminished the light in the ratio of 10 to 3, occasioned a loss of about 70 per cent. of diffuse daylight. A mass of very pure glass about three inches thick diminished the light only about half the latter amount, owing to its being a single mass and not a cut up into many planes.

He also measured the absorbing power of sea-water for light and found as the results of experiments made in France and of observations also in the Torrid zone, that at the depth of 311 French feet the light of the sun would be equal only to that of the full moon, and at the depth of 679 feet would wholly disappear. He estimates the transparency of the air as 4575 times greater than that of sea-water, and from the properties of a logarithmic curve (which he calls *gradulucique*) whose functions he had determined experimentally, he seeks to fix the outer limits of the atmosphere. Bouguer was an expert geometer and sustains all his conclusions by mathematical demonstrations. His results seem to have received less attention than they merit, the only reference to his researches I have seen being by Daguin in his excellent *Traité de Physique*, iii, 300, 1859.

We should not omit in this connection to refer to the very interesting observations of Draper† on the spectrum formed by means of a platinum wire heated gradually from dull redness to perfect whiteness by a volta-electric current. He observed the red part of the spectrum to appear first and as the heat and brilliancy of the wire increased the colors of the spectrum appeared after the violet. This result perfectly harmonizes with views above expressed.—B. S., JR.]—*Silliman's Journal.*

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* *L'Eclaire au Gas a L'Eau a Narbonne et L'Eclairage au Gas le Prince, examines et compares par le* Dr. B. Verver, *Prof. de Chemie et de Physique a l'Athenee Royale de Maestricht.* Leide, 1858, p. 26.

† In his *Journal fur Gasbeleuchtung, etc.*, München, 1859, ii, 377

‡ It does not appear that the distance from the source of light at which the glass screen is placed has any appreciable influence upon the amount of light transmitted by it. At all events, no such influence could be detected in a number of experiments made purposely to test this question.

§ With the ordinary chimney.—Mr. King does not specify what burner was used in his experiments, but it was probably the "fish-tail," which has been so often recommended as a standard by his father, consuming four feet per hour, of course without a chimney.

* *Traite d'Optique sur la Gradation de la Lumiere (ouvrage pos thume) : publie par* M. l'Abbe de La Caille. *Paris*, 1760, 4to, pp 388.

† This Journal [2], iv, 388, and v, 1.

THE GAS-TEST.

AN INSTRUMENT FOR DETERMINING THE VALUE OF ILLUMINATING GAS.

By O. L. Erdmann.

From Werther's Journal für Prakt. Chemie.

While engaged in making some experiments with regard to the production of illuminating gas, which I had occasion to conduct on on a large scale, I was driven to the conviction that the means commonly employed for determining the value of illuminating gas leave much to be desired. And first as regards photometrical experiments, it is known how difficult these are to execute well, and under what uncertainties their results labor in more than one respect. One circumstance especially makes it extremely difficult to pronounce with certainty upon the quality of a gas from photometrical results. This is the very great, and by gas manufacturers scarcely sufficiently estimated influence, which the nature of the burner exercises in emitting light by the burning of the gas. A comparison of the strength of the light emitted by two different gases, when burning in similar burners, certainly does not always give the true proportion of their value. A gas which, in a burner well adapted for another gas, burns with a non-illuminating and bluish light, may, on the employment of another burner judiciously suited to its quality, give out a white and beautiful light. In short, every gas requires its special burner—that is to say, a burner adapted to its own peculiarity, which must be obtained by means of experiments. Consequently, photometrical results can serve for the comparison of different gases only when at the same time the proper or suitable burners for them have been obtained by experiment. Investigations of this kind are tedious and difficult. The art of gas making requires, however, a simple, rapid and easily executed process for obtaining the proportionate value of different gases, the product of different substances, &c. The determination of the specific gravity of the gases is often used for this purpose. This means is very unreliable. If illuminating gas contained only carburetted hydrogen mingled with the hydrogen, then the specific gravity would, under certain conditions, certainly give the approximate value of different gasee. But illuminating gas contains, besides carbonic acid, carbonic oxide and nitrogen, which have nearly the same specific gravity as the olefiant gas. Especially where clay retorts and powerful exhausters are employed in the manufacture of the gas, it would be difficult to draw from the specific gravity of the gases conclusions as to their illuminating value. Under these circumstances, I may be permitted to hope that the simple instrument for testing illuminating gas which I am about to describe in the following pages as a Gas-test, will prove useful alike to the gas-maker and the gas consumers. The Gas-test does not measure the illuminating power directly, but *gives the capacity of an illuminating gas for emitting light when burning in the burning apparatus best adapted to it.* I believe that the proportionate value of an illuminating gas cannot be obtained by any of the known methods so accurately and so rapidly as it can by the Gas-test. And even if the method is not entirely free from faults, and would admit of many improvements, it may yet be sufficiently accurate for practical purposes. It will especially, I believe, in connection with photometrical measurements, serve as a good guide to the gas manufacturer in the choice of burners.

The arrangement of the gas test is founded upon the known fact that the flame of illuminating gas looses a portion of its illuminating power by the admixture of atmospheric air, and, finally, upon a certain admixture of air, burns with a dim blue flame. The amount of air by which the illuminating power of a gas flame is destroyed, is far from being sufficient to consume the gas entirely, the necessary condition being only that sufficient air shonld be present to prevent the formation of free carbon, upon which the illuminating power of a flame is dependent. Only upon the admixture of 4–6 volumes of air, and more, to the illuminating gas, does the mixture become explosive. If we examine a Bunsen gas lamp, which is so contrived that the access of the air to the gas can be gradually increased, we will perceive that the illuminating portion of the flame, which for this purpose is permitted to burn under a glass cylinder, becomes continually smaller: it forms at last only a whitish point above the interior blue cone, and finally even this disappears. The period of the disappearance of this last trace of illuminating power from the flame is marked with tolerable exactness. It might then have been expected that in order to destroy the illuminating power of an illuminating gas more air must be mingled with it, just in proportion to the heavy hydro-carbons contained in the gas.

I have ascertained by experiments that, to a certain extent, and under ordinary circumstances, this is really the case. But as the heavy carburetted hydrogens substantially determine the value of illuminating gas. *so does the quantity of atmospheric air which must be mixed with an illuminating gas, in order to destroy its illuminating power, afford a measure for the value which the gas possesses as an illuminating material.*

After this statement of the principle employed, I proceed to a description of the instrument itself.

The Gas-test exhibited, Fig.. I., in perspective, and Fig. 2 in profile, has in the main point the contrivance of a Bunsen lamp, whose tube (*a*) 18 mm. wide, 195 mm. long, below the place where the air is to mingle with the gas, widens to a hollow cylinder (*b b*), 96 mm. wide, 11 mm. high. In order to let the air enter, there is, in the side of this hollow cylinder, a slit made, running round nearly half its circumference, and one mm. in width. Over the wide cylinder a ring (*d*) is slipped, which, like the cylinder, is pierced by a slit, which also runs round half the circumference, and is everywhere nearly three-fourths of an mm. wide. Thus the slit in the cylinder can at pleasure be closed or opened to give access to the air, by means of the ring, which can be moved by the handle (*e*). On the upper surface of the wide cylinder a division of a circle is placed, running round half the circumference. The movable ring is moreover provided with a marker, which is placed at *O*, as Fig. 1 shows. If the ring is then turned so that the marker moves on the division, the slit opens, and the degree to which the opening extends on the scale can then be read off. The quantity of air streaming into the opening corresponds to the size of this opening. Above the burning tube is a cylinder of blackened plate brass, 80 mm. wide, and 20 centimetres high, fastened by means of an adjusting screw. In the front side of this, a glass plate, 30 mm. wide, is inserted for the observation of the flame. At the height of 10 centim. there is a line in the fore part of the glass plate, and exactly opposite that on the inner side of the cylinder, a second line is drawn, to enable one to regulate exactly the height of the flame; *f* and *g* represent the tube through which the gas streams into the burning tube, seen from the side and from above in its actual size. The dimensions given, namely, the width of the burner, of the cylinder, &c., have, after many experiments and changes, proved to be the best adapted to the desired end. A narrower burning tube does not give sufficient admission to the air for the gases abounding in carbon. A narrower cylinder produces too great a draft, and this is increased by the continued use of the apparatus, since the cylinder becomes warm, and the quantity of air streaming in is thereby increased. In order to make the flame quite still, and so facilitate the safe entrance, there is beneath the cylinder a funnel, so covered with a wire gauze, not very closely woven, that it is only through its meshes that the air can reach the flame. If the gauze be too closely woven, the flame becomes tremulous. The upper edge of the funnel laps somewhat over the lower edge of the cylinder. Below, it is movable by means of a ring on the burning tube, so that, in order to reach the flame, it can be moved down about the space of an inch. The accompanying engraving shows this funnel and its fas-

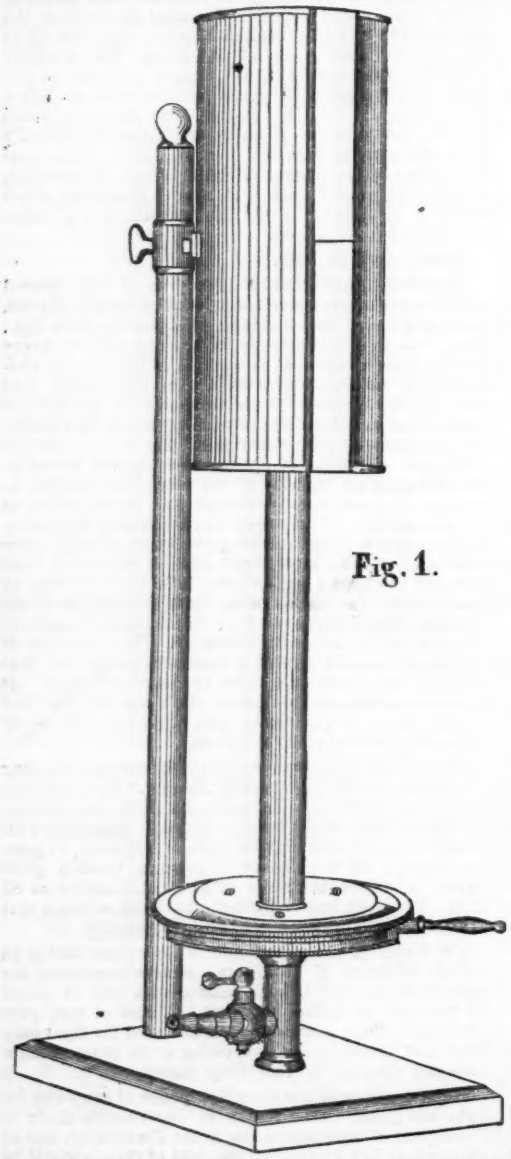


Fig. 1.

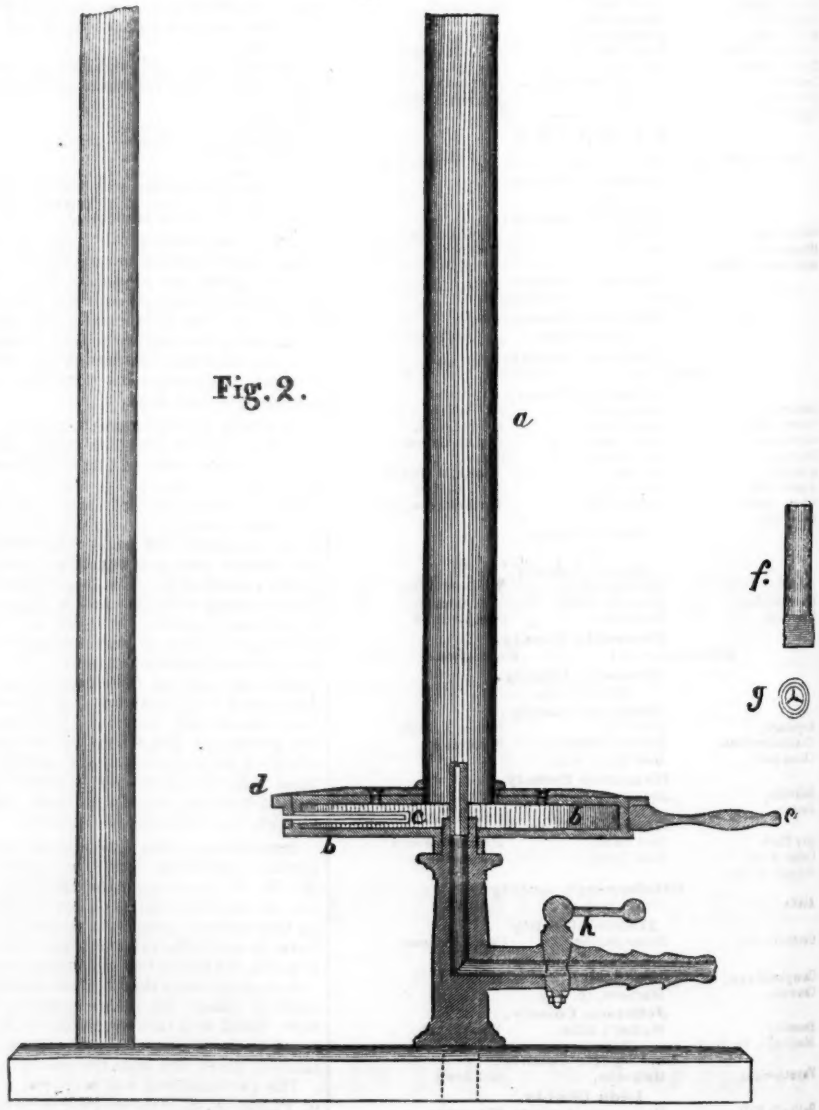
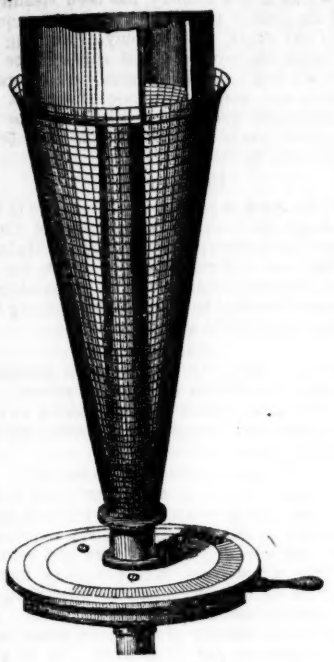


Fig. 2.

tening. The meshes of the gauze are intentionally represented too large, in order to permit the design to appear more plainly.



The apparatus is used in the following manner: After the marker of the ring has been placed upon *O* on the scale, the apparatus, is in a place as dark as possible, united with the gas pipe by means of an india-rubber tube; the gas to be tested is then permitted to stream into the apparatus, it is kindled, and the flame so regulated by means of the cock, that its point strikes exactly upon the lines made at the height of 10 centim. Now in order to avoid errors of the parallax, the eye is so placed that the line in the glass covers exactly the one opposite to it on the inner side of the cylinder. When the air is quiet, and the breath carefully kept from the flame, which is much facilitated by the funnel, the entrance may be effected without difficulty. After that has taken place, the ring must be turned by means of the handle, very slowly, from the right towards the front and left. As by this the slit is opened, the air streaming in for the first few minutes raises the flame very high. Since the eye is dazzled by this, and becomes thereby less sensitive for further observations, it is best at this time to turn it aside. Continuing the turning slowly, and making constantly short pauses, the flame will soon be perceived to be losing its illuminating power. Only a luminous point still shows itself above the inner blue ball or cone. Now the attention must be turned upon this. At a certain opening of the slit the last trace of it disappears. The bright contour of the inner flame, which at the top passed off into the illuminating point, now becomes rounded, and the flame appears sharply defined. If from this point we return backwards, then a whitish light or an illuminating light will soon show itself again at the upper part of the blue cone. The point—easily to be found by a few trials—from which the slightest turning backwards will bring back a white light above the blue cone, must be held fast. After it has been obtained, a thin wax taper is lit by the flame, and the number of degrees to which it has been necessary to open the slit, in order to destroy the illuminating power of the flame, can be read off. The apparatus with a little attention is easily managed, and the measurements, on several repetitions, will give very nearly the same results. The procedure, it is true, must be *practised*, and it is necessary to accustom the eye to the slight differences of light of which we are treating. Persons practiced in observation obtain readily, after a few trials, corresponding numbers. I will give some other details which ought to be observed in testing gas. And first the ring must be turned *very slowly*, and after the first flaming up is over, there must be, after every advance of about 1°, a pause of a few minutes, in order that the gas mixture, which has been formed by the entrance of the air into the tube may have time to arrive at the flame. A flame which, immediately after an increased opening of the slits, may still show a whitish point, will of course not lose this until after the gas which was in the burning tube has streamed up and been consumed. When by a slow advance the place where the illuminating point disappears has been reached or passed, and the contour of the inner flame appears sharply defined, we must then turn back very slowly, in order to obtain precisely the spot where even the very first glimpse of a whitish light appears above the inner ball of flame. We endeavor to come as closely as possible to this point and yet not to reach it. Usually after the first reading is over, which I look upon as preliminary, I turn back the ring until the marker stands at 0, and then proceed *to regulate* the height of the flame. This requires more time, for, from the narrowness of the opening through which the gas streams into the burner, several minutes elapse before the flame can attain its original height; when that has been correctly found or adjusted, I turn the ring quickly until the marker stands at the number found on the first observation. Now, I permit some time to elapse, and watch to see whether the flame shows any illuminating point. If this is not the case, I then go back very slowly, in order to convince myself that the first reading did not give too high a result. The results of the second observation and its repetition are usually more exact then those of the first. In any event, the observations must be repeated until they correspond within at least a degree. We are guarded from self-deception by this, that during the *adjustment* the scale cannot be seen, and the number at which we have stopped can only be read after the lighting of the wax taper or match. It is very essential that the air of the room in which the gas-testing is carried on, should be free from dust. Little particles of dust finding their way into the non-illuminating flame, produce therein little illuminating sparks or flames, which render the perception of the point at which the illuminating tip above the blue ball of flame disappears, more difficult, and make the measurement inaccurate. If soot floats in the air, while, for example a gas-flame is burning with smoke, then the blue ball appears surrounded by a reddish yellow veil, which makes the accurate adjustment impossible. The grades of the scale of the gas-test express no absolute value; their magnitude is arbitrarily determined, and they give only proportionate numbers. A gas is just so much the more capable of evolving light, the wider the slit has to be opened in order to destroy the illuminating power of the flame. In a detailed account of the gas-test which will appear in the third volume of the transactions of the committee on the physical sciences of the Royal Bavarian Academy of Science in Munich, I have described the experiments, from which it is evident that the quantity of air requisite for the destruction of the illuminating power of an illuminating gas is very nearly proportionate to this illuminating power. Some of the results obtained by them I will here briefly detail.

The illuminating gas of the city of Leipsic at the time that I performed the experiments in proof of the gas-test, required 35—38° opening of the slit of the apparatus. I express this circumstance (quality) when I designate the gas as *grading* from 35° to 38°, or as gas of 35° or 38°. With illuminating gas whose *gradation* was determined every day and carried to account according to its value, I mixed pure olefiant gas. It was proved by numerous experiments that the admixture of five per cent. olefiant gas to the illuminating gas raised the *graduation* of the latter about 5·5°. The agreement of the ascertained numbers, and those computed according to the estimation of this operation may be seen by the following comparison:*

						Ascertained Mean.	Computed.
95	Illuminating	gas of	35°	with	5 olef. gas,	38·5°	38·7°
90	"	"	35°	"	10 "	42·7°	42·5°
87·5	"	"	36°	"	12·5 "	45·2°	46·3°
85	"	"	35°	"	15 "	46·5°	46·2°
80	"	"	35°	"	20 "	50·3°	50·0°

In a second series of experiments the illuminating power of the gas was diminished by the addition of hydrogen, in order to see whether the proportion observed would occur with inferior gases also.

						Ascertained Mean.	Computed.
90	Illuminating	gas of	38°	with	10 hydrogen,	34·1°	34·2°
80	"	"	36°	"	20 "	29·2°	28·8°
70	"	"	36°	"	30 "	26·5°	25·2°
60	"	"	36°	"	40 "	24°	21·6°

The first two experiments show the same proportion that was exhibited in the first series of attempts. The last two mixtures are no longer to be considered illuminating gases. It may be seen from the numbers obtained thereby, what has also been proved by other mixtures, that measurements below 28° can not be made with the same precision as those of the richer gases, and always with less as the flames become less illuminating.

By experiments with illuminating gas, from which, by a mixture of fuming sulphuric acid with sulphuric acid free from water, the illuminating elements were more or less entirely withdrawn, (decarburetted gas) similar results were obtained. Gas from which the heavy carburetted hydrogens were entirely withdrawn, showed by the test 20—21°.

Eighty of this decarburetted gas, of about 21° with 20 of olefiant gas gave 39°—computed 38·8°.

Seventy of the same with 30 of olefiant gas gave 48°—computed 47·7°, and so on.

Mixtures of olefiant gas and hydrogen gas gave no great exactitude. For example—

80	Hydrogen gas	with	20	Olef.	gas,	24°	22°
75	"	"	25	"		28·5°	27·5°
70	"	"	30	"		36·4°	33°

In general it appears that these mixtures in proportion used too much oxygen in the consumption of hydrogen, by which the proportion is destroyed.

The experiments which I executed with marsh-gas are of especial interest. Decarburetted gas, a dimly illuminating mixture of marsh gas with hydrogen gas, requires more air for the entire destruction of its illuminating power than a mixture of olefiant gas with hydrogen gas of equal illuminating power. Such a gas, for example, showed 22°. This would correspond to a mixture of hydrogen with 18 per cent. olefiant gas; but its illuminating power was shown by photometrical tests to be much less than that of the last mixture.

Pure marsh gas, obtained by heating acetate soda with chalk, burns in the gas-test with a flame that is not sharply defined, and which, after the unscrewing of the slit, the disappearance of the last light above the scarcely perceptible inner ball (or cone) is difficult to observe. The ascertained mean of many observations gave 26°. This would correspond to a mixture of about 20 per cent. olefiant gas mixed with hydrogen. But the illuminating power of 20 olefiant gas with 80 hydrogen, is at least, according to my experiments, 13 times greater than that of the marsh gas, although the latter possesses the *per cent.* compound of a mixture of equal *portions* of hydrogen and olefiant gas.

Illuminating gas mixed with marsh gas gave results which agree with those to be computed from the compound. For example:

						Found.	Computed.
90	Illuminating	gas of	35°	with	10 marsh gas,	34·1°	34
80	"	"	39°	"	20 "	38°	37

By these experiments, the impossibility of expressing by percentage of olefiant gas the illuminating value of different gases given by the gas-test is plainly shown; for 100 marsh gas would, according to the gas-test, correspond with 22 olefiant gas; therefore, 30 per cent. of the same in an illuminating gas, are estimated 6·5 per cent olefiant gas, whilst its illuminating power is only equal to 0·5 olefiant gas.

According to this, the gas-test can only serve to decide the relative value of different illuminating gases. Even in this the marsh gas causes an error which, however, can in any event be but a trifling one, as may be easily shown.

If the analyses of the illuminating gases from pit coal, executed according to reliable methods, be compared, it will be found that the marsh gas contained therein varies from 35 per cent. to 45 per cent. By means of Frankland's† numerous analyses of illuminating gases from the most different English pit coals,† (apart from the hydrogen gases), and further from Landolt's analyses of the Heidelberg gas,‡ as well as from Wunder's analyses of the Chemnitz gas. By means, therefore, of analyses which embrace gases of the most different qualities, from the most valuable to very inferior ones, an average amount of 40 per cent. of marsh gas in pit coal gases § is obtained. If, therefore, 40 per cent. be assumed as the normal quantity, then the error, in the valuation of an illuminating gas, caused by contaminating a greater or less amount of marsh gas, cannot be of much importance. If, for example, a gas contained 50 per cent. marsh gas—consequently 10 per cent. more than was assumed—it would give on the gas-test something over 2° too much, and *vice versa*. The gas from Pelton coal analyzed by Frankland, for example, containing the low proportion of 32·9 per cent. marsh gas, would appear on the gas-test 1° too low. Only the gases generated at a low temperature, very rich in heavy carburetted hydrogen, can contain an amount of marsh gas exceeding the assumed average, and in this case appear too highly graded on the gas-test. The inferior gases, on the other hand, rich in hydrogen generated at a very high temperature, in so far as they contain less than 40 per cent. of marsh gas, would show by the test somewhat too low an amount, if this error were not counterbalanced, probably overbalanced, by the circumstance mentioned above: that flames abounding in hydrogen require somewhat more air than corre ponds or agrees with their contents of carburetted hydrogen.

For water gases and orrel gas, which contain less marsh gas than the ordinary pit coal gases, the scale of the gas-test must be somewhat modified, or the results they give by it must be reduced according to the average of the analyses of both kinds of gas. for by the gas-test they would appear, in comparison with ordinary coal gas, too inferior by some degrees.

In experiments with carbonic oxide and nitrogen, in order not to leave any of the co-operating element out of consideration, I found that both are without any influence on the results. The flame, of a mixture of 70 vol. nitrogen with 30 vol. olefiant gas, is very sharply defined, and is especially adapted for an exact adjustment of the height. Upon the opening of the slit, it forms a beautiful inner cone, the illuminating point of which disappears precisely at the opening of the slit to 25°. I recommend this mixture for the determination of a fixed point on the scale. and for the testing of a gas-test to its agreement with my model. (Original.)

By a series of experiments which will be given in my larger treatise on the gas-test, it was shown that the height of the flame is a sufficiently accurate measure of the *consumption* (consums) for the gas to be tested, at least for illuminating gases whose *graduation* lies between 30° and 50°. The differences caused by the different rapidity of the efflux of different heavy gases, will, with an apparatus of the selected dimensions, be fully counterbalaced by other circumstances, as has already been shown by the numbers given above. With gases of an unusual composition, the employment of a small gas clock, to determine the consumption of the gas, might be useful.

In my larger treatise I shall give some information as to the relation of the results of the gas-test to those of the photometer. I have not been able to pursue this subject as far as I wished, because here scientific investigation must go hand in hand with mechanics, with respect to the choice of, and alterations in, the mechanism of the burners. Several series of experiments have, however, sufficiently proved that the results of the gas-test fully agree with the strength of the light evolved by the tested gas in a properly chosen burner. Thus a gas

* The decimals arise from the computed mean. The measurement can only be executed with accuracy up to one degree.

* *Ann. de Chem. n. Pharm*, lxxxii., 1.

† Gas from Boghead coal excepted, which is not of itself very available.

‡ Upon the chemical processes in the flame of illuminating gas.

§ The analyses by Verner (*L'Eclairage au Gaz a Veau a Narbonne, &c.*—Liege, 1859) gives, it is true, a proportion of marsh gas of 54-57 even in *water gases*; but it can scarcely be doubted that this high proportion results from the methods employed in the analyses, namely, from the manner in which the carbonic oxide gas was determined through ammoniacal solution of chloride of copper. I have also thought it necessary to disregard Henry's earlier analyses, executed according to imperfect methods.

from Zerickan coal gave in the first, second, and third hours the degrees of light—

18 3 : 16·9 : 12.

A test with a narrower slit than the one now chosen gave the proportion of these gases to one another—

62 : 56·3 : 40.

Which, after the first hour from the last two, from the strength of the light would be estimated—

62 : 57. 40·6.

Finally, I will give as examples of some gas testings, the following:

Dresden, on the 14th of March, 1860, *performed* or *determined* in company with Professor Stein and partly by him, in the laboratory of the Royal Polytechnic School:

33·3°, 34°, 34°, 34°=34°.

Riesa, Gas of the bath court (Hof.)

43°, 42·5, 42·5°, 42°=42·5°.

Chemnitz, March 16th, determined with Dr. Wunder in the laboratory of the Royal School of Arts:

32°, 32°, 32°, 31 2-3°=32°.

The gas was also tested photometrically by way of comparison. In an argand burner with 32 holes, burning with an hourly consumption of 6¼ c. f. Sax. (=5 c. f. Eng.), it gave, compared with the flame, 44 mm. high of an English normal wax candle, 16½ degrees of light.

Leipsic—Mean of the observations from the 8th of February until March 9th, 35°.

Mean of the observations from March 17th until April 18th, 37°.

April 23d, 35°, 35°, 35°,
" 27th, 35°, 35°, 35°.

It has become evident, in manufacturing several specimens of the gas-test, that it is impossible to give an exactly similar width to the slits in any two instruments. I have, therefore, been obliged to refrain from giving a measure of the width of the slit. In order to make the scales of different apparatuses agree, there must either—by means of a mixture, which admits of very precise observation, such as I have given above—be a point of the scale fixed, and the division (partition) marked out from that, or every specimen must be compared with a normal instrument by employing the same illuminating gas, and by this means a fixed point ascertained for the scale. It is thus that are regulated the instruments agreeing with my model, which are for sale by M. Hugershoff, Leipsic, and M. Blockmann, Dresden.

Note by the Translator, for the AMERICAN GAS-LIGHT JOURNAL:

The words grading and graduation in the above translation, are in the original grädig and grädigkeit. They are not to be found in any dictionary to which I had access, and I translated them according to what I supposed to be their meaning from the context, and from their root, grade.

The words gas-technik and gastéchniker I have translated gas-making and gas maker or manufacturer, which must be their meaning from the context. They were not to be found. Technik means "the science of technical terms."

Einstellung der Höhe I have translated *adjustment* of the height—perhaps *ascertaining* would be a better word. Literally einstellung is a putting in or a leaving off.

HANSEN'S NEW GAS-METER.

Mr. Hansen, of Heide, Holstein, Germany, has invented a new gas-meter of very simple construction, which requires only a small amount of liquid to seal two upright cylinders, the level of the liquid not exerting any influence upon the accurate measurement of the gas. He uses instead of water, a cheap non-freezing fluid obtained from asphaltum, which, protecting the meter metals from oxydation, adds greatly to the durability of the meter. From the description—not accompanied by any drawing—it is impossible to form a clear idea of the construction of the meter. It is said to vary greatly in shape from the meters now in use, and to consist of two upright cylinders, connected by a vertical partition, to the upper part of which a dial-plate is attached. An opening in the partition allows a glass tube to be seen with the level of the oil. The meter can be taken apart without unsoldering any joints or loosening any screws, a great advantage in case repairs are necessary.

BOSTON GAS-METER WORKS.—The third meeting of the creditors of this insolvent corporation will be held at the court-room of the Court of Insolvency in Boston, Mass., on the 18th day of December next, at ten o'clock in the forenoon, at which meeting creditors may be present, and prove their claims.

NASHVILLE, TENN., DIRECTORY.—A copy of this valuable work for 1860–61, has been received, and presents an interesting and useful compendium of the manufactures, professions and general business of that flourishing city, together with a well executed map of it.

SMYRNA, DEL.—Authorised capital, $50,000; stock issued, $16,000; shares $10 each. Population of gas district, 2,000; private meters, 75; public lamps, 18; Aubin Works, using rosin and cannel coal. 9,000 feet of mains laid, mains joined with lead and proved under 6-inch of mercury, with air. Lit up on Thursday night, 7th Dec., for the first time. Hon. Wm. Temple, President; Chas. N. Trump, No. 56 North 7th street, Philadelphia, engineer and contractor.

ANNUAL MEETING OF THE GAS-LIGHT ASSOCIATION OF THE STATE OF NEW YORK.

The annual meeting of this Association was held at its office in this city on Wednesday morning, November 21st, WILLIAM W. FOX, Esq., President, in the chair.

The following companies were represented:

Albany,	New York,
Brooklyn,	Rochester,
Buffalo,	Syracuse,
Glenn's Falls,	Troy,
Harlem,	Utica,
Hudson,	Williamsburg,
Manhattan,	Yonkers.

The following gentlemen were elected officers for the ensuing year:

WILLIAM W. FOX, President,
ROBERT NICHOLS, Vice-President.
THEODORE W. PARMELE, Secretary.
CHARLES ROOME, Treasurer.
E. W. LEAVENWORTH, O. G. STEELE, GEORGE W. PARSONS, CHARLES ROOME, B. C. HUMPHREY, } Executive Committee.

The meeting was very harmonious, and the discussions of unusual interest, but not being intended for publication, we merely append the Report of the Executive Committee, which we commend to the attention of the several gas-light companies of this State, and take this occasion to repeat that it is manifestly the interest of every company to avail itself of a seat in this Association. The interest is not local nor sectional, but of that universal character that affects each and all alike.

The Executive Committee of the Gas-Light Association of the State of New York respectfully submit the following

REPORT.

The subject of forming an Association of Gas-Works' Managers in this State, has often been discussed by members of the older companies, in view of the rapid increase of gas-works. A very considerable number of the companies of the interior necessarily fell in charge of parties without previous experience, and the works themselves have not always been constructed in the most scientific or workmanlike manner. The necessity, therefore, of availing themselves of the experience of others, in the construction or management of works, and the never-ending detail of relations with consumers and municipal authorities, became very soon apparent to parties owning and managing gas-works. With this view, several gentlemen connected with companies in the larger cities projected a plan for an association in this State, and in pursuance of an invitation, representatives from a fair proportion of the regularly organized gas companies met at New York on the 16th November, 1859, and adopted the Constitution and By-Laws under which this Association is governed.

OBJECT OF THE ASSOCIATION.

It has now been organized for a single year, and its scope and intentions are perhaps not fully understood. To the acting Executive officers its advantages, although as yet but partially developed, are very apparent. The interests of all regular gas companies in the State are in a great degree identical, and never antagonistic. Their relations with proprietors and consumers, both public and private, are essentially the same; and harmony in general policy, modes of manufacture and distribution, is indispensable. It is the object of this Association to induce unanimity of feeling and action, and to create a system of transacting business which will promote the true interests of gas companies and their consumers. Such are the leading features of our organization, and it will be seen that, to effect its full purposes, a general cooperation of the gas companies of the State is of primary importance. The business of gas manufacture is comparatively in its infancy; great improvements have been made during the last twenty years, and its progress will still be onward.

It is therefore the interest of every company to promote scientific improvements, in the adoption of which a common benefit can be derived.

COMPETING GAS COMPANIES.

The past year has not been marked by any unusual excitement, except perhaps from what appears to be a concerted movement in several of the larger cities in the direction of competing gas companies. In some of these cases, except Brooklyn and New York, has any actual progress been made in construction; but an agitation has been kept up, unsettling to some extent the public mind.

All experience in Europe and in this country, so far as it has been tested, has shown conclusively the folly of such efforts, resulting uniformly in disaster to the attacking interest, as well as injuriously to the public.

In regard to competing gas companies our views and policy should be distinctly understood. It is not sufficient that such projects are useless to the public and disastrous to the stockholders. They originate with parties having ulterior objects in view; they are not understood by the public, and arguments showing their real character pass unheeded.

CONSTUCTION AND WORKING.

The progress of construction, and the details of working gas works in this country, has been steadily improving, and the quality of gas manufactured is quite equal to that of any other. In economy of working there has been constant improvement, and although the cheapness of materials and labor in Europe, the compactness of cities and towns, and the low rate of interest give them great advantages, yet, with a fair allowance for these circumstances, gas is furnished in this State on quite as favorable terms as there.

CLAY RETORTS.

One of the most important improvements in the manufacture of gas has been the introduction of clay retorts: experience has demonstrated their superiority in economy of original cost and construction, and in the increased yield and improved quality of the gas produced. Clay retorts may therefore be safely classed among the established improvements in gas manufacture.

EXHAUSTERS.

The use of exhausters has also been introduced to a considerable extent with satisfactory results. They are now made in this country of good quality at low prices and of various sizes, bringing them within the reach of a large portion of our gas companies.

GAS APPARATUS AND FIXTURES.

In this connection it is proper to state that the progress of the gas interest in this country has created manufactories of nearly every interest required in construction and working. Fire-bricks and retorts which, until within a few years, were generally imported, are now supplied by our own manufactories, of equal, if not superior quality, and at quite as low prices. The same can be said of machinery of all kinds, street mains, tubing, meters, fittings, gas fixtures, &c. It is clearly the policy of the gas companies to encourage these different branches of home manufacture in preference to those from foreign countries.

WATER, WOOD AND AIR-GAS.

The great number of projects which are before the public, known as water and wood gas, air-light, &c., have been unusually active the past year. They are all varieties of rosin and other hydro-carbon materials: the same elements have been repeatedly brought before the public in different forms and various aspects. Thus far none of these so-called improvements have established any claim for superiority over coal-gas as now manufactured by regular gas companies. Gas, in its simple form, can be made of an infinite variety of materials, and experiments *apparently* successful and very plausible are being constantly made; but the bituminous coals in common use have been found to possess all the elements required to produce a steady, safe and reliable light in the most economical form. The residuum of coke, tar, &c., are elements of value generally overlooked by theorists; but when added to the direct value of coal in the production of gas, render it superior to any other known material.

OTHER NEW IMPROVEMENTS.

It is by no means the policy of gas companies to interpose obstacles in the way of improvements, or new developments in gas manufacture. Every new project should be treated fairly, and if it stands the test of science and experience, should receive proper encouragement. The numberless theories constantly being broached, which carry with them their own evidence of worthlessness, should not prevent us from giving every one which presents itself a candid consideration.

GAS METER INSPECTION.

It is the duty as well as the true policy of a gas company to conduct its business so as to establish a character for fair dealing, and to secure, if possible, the confidence of the public. Every community contains its proportion of selfishness and illiberality; still, if we are careful to avoid all just ground of complaint, interested assaults and misrepresentations will fail to do us serious injury.

For several years past, attacks have been made upon the gas interest in the Legislature, principally from the larger cities, and by parties having sinister objects in view. It has been necessary for the committee to give constant attention to these proceedings, causing much personal labor and anxiety. The most important result of these movements has been the passage of the law of 1859, creating the department of Meter-inspection. This law, as pressed upon the Legislature, contained provisions which were exceedingly unjust, and which your Committee succeeded, after much labor, in having removed. As it finally passed, although in some respects oppressive to the companies, yet it contains valuable features, and establishes some important principles. The system of meter inspection protects the public perfectly in that respect, and its rights in the matter of gas supply are fully recognized and fortified.

This law notwithstanding some objectionable features, is perhaps as favorable as can be hoped for. Prejudices against gas companies are easily excited, and there are those who annually appear before the Legislature to turn their prejudices to account.

There is no difficulty in disabusing fair-minded legislators of the charges usually made, for they prevail as generally in other states and countries as in our own; but it requires patience and judicious attention.

NEWSPAPER ATTACKS.

Great injustice is often done to gas companies through the public press, not by the editors, but by the admission of anonymous articles, containing charges which the facts will not sustain. These articles reflect real or imaginary grievances, which the writers would find prompt-

ly remedied or explained to their satifaction on application at the gas office. These cases are annoying, but must be submitted to. The only way to meet them is by a steady adherence to correct principles, and by an earnest endeavor to deal fairly and justly with all. Anonymous attacks rarely deserve attention, but when specific charges are made, we should meet them promptly.

AMERICAN GAS-COALS.

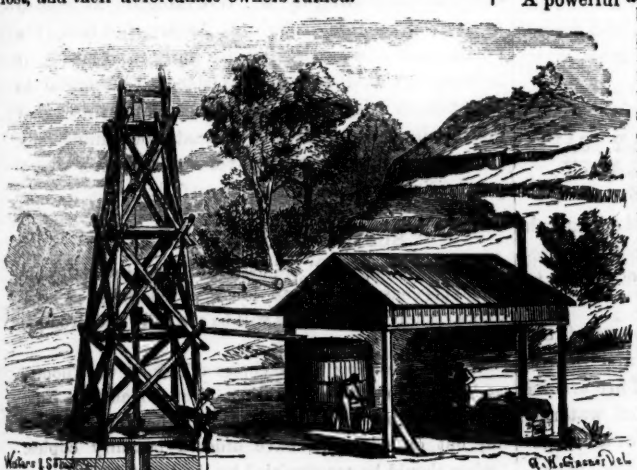
American coals are now used extensively for gas purposes, except upon the Atlantic coast, where English coals are generally furnished at lower rates. The coals from the west of the Alleghanies, in Pennsylvania and Ohio, have proved to be quite equal, and in some localities superior, to the English. It will be well for gas companies to encourage the mining and bringing to market the best varieties of American coals. Increased demand will create increased facilities for mining and transportation; and if they can be furnished at a reasonable price to the companies which are now compelled to rely upon a foreign source, there will be mutual benefits conferred upon all parties concerned.

In conclusion, the Committee would call upon the several gas companies of this State to become members of this Association, and contribute as far as possible to the objects contemplated. With a general co-operation of the gas interest great advantages must accrue, in which all can participate, and in which all have a common interest.

A PRACTICAL TREATISE ON COAL, PETROLEUM, AND OTHER DISTILLED OILS.

By ABRAHAM GESNER, M. D., F. G. S., &c. New York: BALLIERE BROTHERS, 440 Broadway.

The business of manufacturing coal oils and the various products of the distillation of coals, is one of great magnitude in this country, as well as in other parts of the world. Although, comparatively speaking, it is a new branch of enterprise, much capital has been invested in it, and we regret to say, many have unwisely entered into the business in entire ignorance of its first principles, and thus large sums of money have been irretrievably lost, and their unfortunate owners ruined.



This work of DR. GESNER'S is a valuable contribution to technological science, and its advent will, no doubt, be duly appreciated by those who desire instruction in regard to the practical bearings of the subject. The large experience of the author qualifies him to explain the various processes in an intelligible manner; and in the work before us he details the several steps of the manufacture, from the production of the crude oils to their final purification, including also an account of the various other compounds, which are formed during the distillations. As the oil springs of Pennsylvania and the neighboring States have attracted much attention during the past few years, we insert a cut from his treatise, illustrating the mode of sinking the wells, merely remarking that those interested in property in these regions will meet with many valuable hints in DR. GESNER'S pages, as regards the economical production of the oil from the crude material.

The author states in the preface that the work was written to aid the manufacturer of coal oils; and professes to be more practical than theoretical in his treatment of the subject. Consequently it furnishes to the unprofessional reader a more accessible fund of information than if written strictly with a view to scientific effect. The book is handsomely printed, profusely illustrated, and contains but few typographical errors.

As we have already announced, the coal-oil interest is one of the specialties of this JOURNAL, and we invite communications in reference to it and to the subject of petroleums, at all times.

THE VALUE OF COAL, AND THE NECESSITY OF ECONOMY IN ITS USE.

However other circumstances may have conspired to raise Britain to pre-eminence in the arts, manufactures, and commerce, its store of valuable coal is unquestionably the grand basis which has sustained the whole.

The present enormous consumption of coal, with the wasteful modes of working and using it, demands the serious consideration of the philosopher, while the prospect of its final exhaustion at no very distant period, must fill the minds of the patriot and philantropist with feelings of the most intense anxiety.

The present generation seem to rest sailsfied with the idea that coal will last their time, and that of their children and grandchildren; and even should the conviction be forced upon the minds of any that the coal in the northern and midland counties of England is rapidly diminishing it is the fashion to point to the coal field of South Wales as a source from whence an almost unlimited supply may be drawn, after all the other beds have been worked out; but this is a great fallacy, inasmuch as the extend of the supply from that quarter has been always sadly over-rated.

The continuance of the smoke nuisance in towns and manufactories evinces a disregard to economy to the public comfort, and to the dictates of the philosopher, who has labored to inculcate the true principles of heat and combustion.

The object of the present notice is to point out to the inhabitants of the Metropolis an improved system of domestic economy by the use of gas instead of raw coal. The present daily average consumption of coal in and around London is upwards of 9,000 tons throughout the year; during the winter it must far exceed this! That such a mass of bulky material should be transported upwards of 300 miles and distributed over London daily, is startling and almost incredible.

The practicability and advantages of using gas for cooking and other domestic purposes are now fully established.

A powerful and most economical gas may be formed by saturating steam with carbon. The gas should be manufactured near the colleries, in large furnaces, similar to iron furnaces, but not so lofty, and by an alternating operation—that is to say, by successively blowing in air to raise the coal and furnace to a high heat, during which time the products of combustion must be allowed to escape, and then throwing in steam to form gas. The steam heated by the gasses passing off, is to be introduced at the upper part of the furnace, and confined so as to force its way downwards through a dense mass of highly heated coal, by which means it will become fully charged with carbon.

Between these two alternations a portion of fresh coal is to be introduced into the furnace. The gas thus obtained will consist of equal volumes of carbonic oxide and carburetted hydrogen, together with the gas of the fresh coal.

Carbonic oxide is an important gas, but chemists and gas-engineers entertain many erroneous notions respecting it. This arises from the difficulty of forming true carbonic oxide on a small scale; because, if any carbonic acid should be present, it renders the gas worse than useless; hence these mistakes.

One set of gas holders must be provided near the works, from whence pipes must be laid to London, where another set of gas holders must also be provided: into the latter the gas will require to be forced by air pumps, drawing the gas from the pipes. In the outset the gas may be laid on to the stove grates at present in use, which are to be filled with an incombustible non-conducting material, such as pieces of porcelain, biscuit or broken fire bricks, having an arrangement for regulating the supply of air. When a fire is required, it will be necessary only to turn on the gas and apply a lighted lucifer match. The advantages of this system to the housekeeper will be economy and cleanliness; there will be no further occasion for coal-cellers, fire-wood, ash-bins, or attendance upon fires; no soot, and consequently no sweeping of chimneys. The advantages to the public would be, that the atmosphere of London will be free from coal smoke, the streets and thoroughfares will be relieved from the obstruction of coal-waggons, the Thames above bridge from that of coal-barges, and below bridge from that of fleets or colleries. The national benefits will be saving of coal, and a proportionate promulgation of Britain's prosperity and power.—*Chemical News.*

THE FALLEN ROOF OF THE CITIZENS' (OPPOSITION) GAS-LIGHT COMPANY'S RETORT HOUSE, BROOKLYN, N. Y.—The Directors have paid off the contractors and transferred the work to the exclusive charge of their engineer, Mr. Tyler Sabbaton, under whose direction the new roof will be erected and the works finished. This is a complete vindication of the Engineer, and as gratifying to him as it is deserved, besides being the disposition of the work which should have been made at the outset. Gas Companies are very apt to ignore their own officers by going outside to save a few dollars by shrewd contracts, but they generally have to pay for it in the end. Having employed a competent engineer, give him the tools, and keep him up to time, you will then have no difficulty.

ON A CONTINUED INDICATION OF THE SPECIFIC GRAVITY OF GAS.

By DRS, J. BOSSCHA and L. C. LEDOIR, Leyden University.

Several gas-engineers may have felt the want of an instrument of simple construction, serving to determine by an easy experiment, the more or less valuable qualities of gas issuing from the different kinds of coal, and from coals of the same kind subjected to different degrees of heat.

Considering that the lighting power of gas, according to the experiments of Clegg and others, corresponds directly to its specific gravity, we tried a series of experiments with apparatus based on the principles just explained, but of different constructions, and at last succeeded devising an instrument answering all the conditions required.

This apparatus simple in its application, may perhaps be found useful in gas works. Its construction may be easily conceived by the following indications:—A glass balloon having a volume of about half a litre (= 30 cubic inches = 1 wine pint), is hung at one end of a balance with an inflected beam, such as used for ascertaining the weight of letters. The accuracy and sensibility of this balance must be so great that variations in weight of one milligramme (= 0·01 English grain) make themselves visible on the circular scale, over which the longest downward inflected end of the beam moves.

The whole apparatus is placed under a glass vessel having an in and an outlet for the coal gas, and standing in a pneumatic trough.

It will easily be understood that if the vessel is filled with gases of different specific gravities at the same degree of heat and pressure, the beam of the balance will assume a different specific gravity of gas. Our scale is divided into equal degrees, and their value fixed by filling the vessel first with pure hydrogen and afterwards with air. The weight of the glass balloon must be as low as possible; the one we had made use of had, together with the hook, a weight of no more than 45 grains.

It seems not difficult for micro-chemical glass apparatus makers to blow balloons of the proportions just described, but they have the disadvantage of being very fragile.—*Chemical News.*

METROPOLITAN WATER, OCTOBER 1860.—The composition of the London waters, according to the analysis of Dr. Robert Dundas Thomson, F. R. S., is not essentially different from that which they afforded in the preceding month. The analyses of the Loch Katrine and Manchester waters are given for the sake of comparing rain waters collected immediately after their fall, and secured from sewerage contamination with the waters of rivers or open canals, which to some extent act as sewers, or are liable to be rendered impure by the proximity of population. The Great Yarmouth supply contains some peaty matter in solution which might probably be removed by modified arrangements.

	Total Impurity per gallon.	Organic Impurity per gallon.
	grs. or deg.	grs. or deg.
Distilled Water	0·0	0·0
Loch Katrine Water, new supply to Glasgow	3·16	0·96
Manchester Water Supply	4 32	0 64
Great Yarmouth Water Supply	20·96	3·04
THAMES COMPANIES.		
Chelsea	21·40	1·88
Lambeth	21·20	2·08
Southwark	20.40	1·12
West Middlesex	20·16	1·24
Grand Junction	20·28	0·84
OTHER COMPANIES.		
East London	23·40	2·04
New River	20·08	1 12
Kent	24 64	1·60

The table is read thus: Loch Katrine water contains in the gallon 3·16 degrees or grains of foreign matter in solution, of which ·96 degrees or grains are of vegetable or animal origin.—*London Times.*

PURIFICATION OF PARAFFIN.—Those paraffins which do not become clear, and remain too soft after purification with sulphuric acid, P. W. Wagenmann, of Neuwied, recommends to be melted with a small percentage of oleine, then to be pressed while warm, and afterwards boiled with a weak alkaline ley. He treats it with five or ten per cent. of oleine, and as this does not dissolve paraffin, the mineral oil and oleine only are removed by pressure. The mixture of mineral oils and oleine is distilled with superheated steam. The mineral oils distill at 220°, and oleine at 280°.—*Chemical News.*

NATURAL RESERVOIR OF GAS.—The *Kanawa* (Virginia) *Republican*, noticing the "workshops of nature," in Western Virginia, says: "The extent of her manufactory of gas down in the lower regions, near Malden, on the Kanawa river may be estimated by the fact that when, in the spring of 1844, in boring a salt well, at the depth of 1,000 feet the augur struck the reservoir of gas, the stream of gas that rose to the upper surface was so powerful as to shoot the whole boring apparatus, consisting of 1,000 feet of poles and a sinker weighing 500 pounds into the air, like an arrow. The stream of gas is three inches in diameter, and has been blowing up with unabated force, day and night, for *sixteen years*. When our railroad is completed, this gas may be turned to some account. Pipes may be laid along the road so as to light up by night the whole road, east to Richmond and west to Cincinnati, and then enough to spare to light up three cities."—*Philadelphia R. R. and Mining Register.*

THE AMERICAN GAS-LIGHT JOURNAL is published on the 1st and 15th of every month, and is specially devoted to

LIGHT, HEAT, WATER-SUPPLY, AND SEWERAGE.

Its purpose is to ascertain and make known all new discoveries in the science and economical application of LIGHT, and promote thereby the interests of companies and consumers; to encourage and aid the introduction of PURE WATER from Lakes and Rivers into Towns and Cities, and to improve the system of SEWERAGE, VENTILATION, and DRAINAGE everywhere.

Incidentally with these results, the business of all Gas and Steam Fitters and Plumbers; the erection of Gas-Works and Water-Works; the consumption of Coals, the manufacture and consumption of Coal-Oils, the manufacture of Gas-Pipe, Water-Pipe, Steam-Pipe, Gas Fixtures, Gas-Meters, Water-Meters, Retorts of iron and clay, and their varied apparatus; of Drain Pipes, Ventilating, Heating and Dredging Machines, will be increased immeasurably.

THERE ARE 20,000 CITIES AND TOWNS IN THE UNITED STATES, CAPABLE OF SUPPORTING GAS-WORKS, WHILE THERE ARE NOT 400 GAS-WORKS IN OPERATION IN THE WHOLE COUNTRY!!!

New works are now springing up, however, every week, and they will continue to increase rapidly hereafter.

Advertisers of Gas-Coals, Coal-Oil, Water, Steam, Sewerage and Ventilating apparatus, and of Iron and Brass manufactures, &c., will find the AMERICAN GAS-LIGHT JOURNAL the most desirable and efficient medium of any in the United States, going, as it does, direct to the parties interested in those subjects.

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THE
AMERICAN GAS-LIGHT JOURNAL.
PUBLISHED SEMI-MONTHLY.

PROPRIETOR, JOHN B. MURRAY. } { EDITOR, C. ELTON BUCK.

SATURDAY, DECEMBER 15, 1860.

In seasons of commercial embarrassment, when securities of all kinds take a downward tendency, and a glance at the share list presents a gloomy picture to the capitalist, the value of gas-light shares as the only safe, permanent investment, must be impressed upon every reflecting mind. While the shares of railroads, banks, and a majority of other corporations exhibit a feverish fluctuation, caused by the vicissitudes of trade, political huckstering, or other disturbing influences, gas-light shares remain, almost alone, unharmed by these depressing financial convulsions, and their holders repose in them a degree of confidence, seldom felt in regard to any public securities. The present time affords a graphic illustration of the force of our remarks. While the Union seems shaken to its very centre by the unfortunate political dissensions we are now witnessing, and even Goverment and State securities, usually deemed so firm and stable, are declining, and their holders suffering great anxiety as to their future, we have known of no single instance of the depreciation of gas-light stocks, nor of a dividend being passed from any cause. The reason of this must be clear to the perception of every inquirer. Gas-light has become a prime necessity of our nature, and is as indispensable to our social and moral existence, as are the bread we eat and the water we drink to our physical being. It is not our intention to enter into any argument here to show the superior advantages of gas over other materials used for artificial illumination. Such an announcement would, indeed, seem futile to most of our readers, who live, as it were, by gas-light; and who have mastered the subject in all its details. When we take a view of the whole country however, and reflect upon the number of towns and villages rapidly springing into existence, and consider the comparatively small number of gas-works in operation in the Union—it seems as if some argument were necessary to convince us, as a nation, of the superiority of illumination by gas over any other means.

The announcement which stands at the head of our columns—that of 20,000 towns in the United States, capable of supporting gas-works, *not 400 gas-works are in operation in the whole country*,—is, indeed, a startling one, and in the minds of some might be construed into an opinion derogatory to the national character for enterprise which has been generally conceded to us; and would seem to indicate either that we need some further enlightenment on the subject, or that our vaunted spirit of energy and discernment is not always displayed. Which horn of the dilemma shall we take?

In this important matter of gas illumination, our trans-Atlantic friends are far in advance. They have improved every opportunity, and have evinced an enterprising disposition, which we would do well to imitate in this respect. In England, Scotland and Ireland, particularly, almost every town of even a thousand inhabitants has its gas-works, and the results, even in places of such limited demand for light, are anything but discouraging, as is attested by the tabular statement of the gas-works of Great Britain and Ireland, published in the JOURNAL of Oct. 1st., of the present year, pp. 100–103. The dividends which the works of even these small villages annually declare, prove that gas can be profitably introduced into many of our American towns which have hitherto been considered too unimportant to support works.

Here then is a field full of promising points, commending itself to the notice of our constructing engineers,—a branch of enterprise which will stand unharmed by any commercial revulsion, and which promises large returns. The people must have light: who will furnish it for them?

THE WATER-METER THE ONLY SAFE-GUARD AGAINST PUBLIC CALAMITY AND PRIVATE DISTRESS.

On page 152 of this JOURNAL, published one month ago this day, the following language was used in reference to the urgency of adopting water-meters to regulate the supply of water.

"Especially is it the duty of the officers of the Croton Aqueduct Department and the Water Boards of the other cities, where the dangers of fire are increased by the large and wasteful use of water at the approaching inclement season, to put an immediate stop to the wicked waste that is rampant everywhere. It is a consideration that admits of no procrastination, and with the remedy at hand, nothing short of the most culpable negligence will be regarded as a reason for further delay in execution."

There was little ground for thinking that these words would so soon be clothed with prophetic consequence, but so it seems they were, for on the night of Wednesday, Dec. 5, this city was in an instant deprived not only of the supply of water but of the means of replenishing it, until the tedious delay of extensive repairs to the broken mains should be completed.

We do not propose to write a homily upon the subject. The lesson of the past two weeks is impressed upon the mind of every inhabitant of this city, old and young, but the impressions are unfortunately evanescent. The moment the supply is restored the same waste and recklessness will run riot, and improvidence will characterize the public use of the water until another and, perhaps, a fearful repetition occurs.

Under the powers conferred upon the Commissioners of the Croton Aqueduct the remedy lies, clearly, with them.

These gentlemen are personally and officially responsible to the people of this city for an adequate and constant supply of water. They are bound by their oath of office, by their mere acceptance of office, to fulfil this trust. They are severally and individually responsible for all waste and damage which may result from their neglect or omission to throw around the priceless treasure in their keeping every safeguard within their reach—as much so as would be the custodian of a bank, neglecting to secure its vaults by bars and bolts. We speak of their liability, morally, of course.

Now, the break that occurred in the great mains, on the night of the 5th inst., found the supply in the Distributing Reservoir at too low a point, resulting from the very wasteful drain which exhausts the supply in the most favored season. Had meters been attached to public and private buildings, the accident would have found us with a full reservoir, and a comparatively bountiful supply for many days; no machinery need have been stopped, no operatives deprived of work and bread.

We therefore, call again upon these gentlemen to avail of this moment of alarm to apply meters at once to the largest outlets, to regulate, or at least to ascertain, the actual consumption, that some calculation may be made of requirements which to this day have not been fully met.

It is time for Commissioners to abandon the publication of cards, warnings and other official notices, as useless and futile. Fancy a Gas Company supplying light to a city without the ability to regulate or even ascertain the consumption, and when finding the drain upon their production alarming, issuing "cards" requesting people to economise their light! We venture to say that neither of these Commissioners would sanction such a course in his private affairs for a moment.

The evidence before us, from several Water Companies in this country, are conclusive, that the meter manufactured by Mr. Worthington, as before mentioned, is amply reliable. As proof of this, it is getting into more extended use daily, and surely if in less populated towns it is deemed essential to adopt them it is the more important in this great metropolis. We trust that at least a beginning may be made in this reform—a reform in which every good citizen will cöoperate cheerfully.

BUSINESS DEPARTMENT.

Mr. C. ELTON BUCK, the editor of this JOURNAL, continues his consultations and laboratory business as heretofore. Analyses and Tests will be carefully and promptly made.

We are receiving a few copies of Mr. Lewis Thompson's Chemistry of Gas-Lighting. The demand in England has been so great, that the publisher has not sent any out on sale. We have ordered but fifty copies. Orders should be accompanied by the cost—$2 each.

Messrs. BAILLIERE BROTHERS announce the new work of Dr. Gesner on Coal-Oils as being on sale. It will doubtless have a large sale among those interested in that department of light.

A Photometer and Photometer-Room are advertised to-day, for sale. The room is put together with screws, and can be taken apart and transported.

Orders for Walton's Anti-freezing Apparatus are now coming in. See his terms on page 152 of this JOURNAL for Nov. 15. Orders sent to these rooms will be responded to at once.

On another page will be found a letter from the Keystone Gas Committee, which appears to present further developments and open a new phase in the history of this enterprise. Be the demerits of the Sanders process as great as is generally charged, the gentlemen who represent it certainly show no disinclination to meet their opponents in argument; and the surest way of settling forever this greatly vexed question, is by its thorough and prompt ventilation.

HYDROGENATED FUEL COMPANY.

At the Session of Nov. 26, of the Board of Councilmen the following resolution was offered by Councilman Hogan, and, *passed of course*:

Resolved,—That there be, and hereby is, granted to the Hydrogenated Fuel Company of the City of New York, the right to lay pipes for conducting hydrogenated fuel and other heating agents for heating and other domestic purposes, through the streets, avenues, lanes, alleys, squares, and other public places in said city, for a period of thirty years; the said conductors to be laid under the supervision of the Street Commissioner.

Several attempts were made to refer or table the resolution, but it went through by a vote of 14 to 8. The object of this so-called company, and who composes it, are as yet a mystery, and the movers seem determined to keep dark about it, for the reason, no doubt, that being organised simply for heating purposes, they are not bound to enlighten us. We will nevertheless ascertain what it is and report.

THE CASE OF CAPTAIN MEIGS, SUPERINTENDENT OF THE WASHINGTON, D. C., AQUEDUCT.

Some weeks since the following scurrilous telegram, purporting to come from Washington, appeared in the Administration organ in this city :

Captain Meigs having refused to pay the certificates of Captain Benham for work done on the Washington aqueduct, and declared that he would be governed by neither the orders of the Engineer nor by the Secretary of War, for the payment of any man whom he thinks ought not to be employed on the work, or for any claim which does not meet his personal approval, will probably be relieved from further duty as Superintendent of the works. The act of Congress constituted him Superintendent, and the instructions of the Secretary authorised him to see that the work was prosecuted according to his plans and estimates. In case of the failure of the engineer to do this, he was instructed to report such delinquency to the Secretary of War. The same instructions made him disbursing officer, and authorised him to pay the Engineer's certificates. The President declares that he will have no more to do with the affair. If Mr. Meigs will not obey the orders of his superiors, he must abide by the army regulations. He has endeavored to set himself above the President and Secretary. If his insubordination is allowed to go farther, the effect upon the discipline of the army will be most injurious. It has therefore been determined that Meigs shall either purge himself of contempt, or suffer the disgrace his conduct merits.

Now, we happen to know something about this matter, and propose to give a brief statement of the case, lest the dignified silence of Captain Meigs should be construed into an acknowledgment of the charges implied in the above telegram. We say *dignified* silence, for when the President of the United States can descend to a petty hostility against a subordinate officer of either branch of the service, it is time for that officer to lay aside every other consideration, and repose upon that dignity which he is bound to preserve, and cannot afford to lose. But to the case :

The first appropriation for the Washington Aqueduct in the United States' Laws of 1853, chap. 97, was in these terms : "The sum of one million of dollars * * * * to be expended under the direction of the President of the United States, for the purpose of bringing water into the city of Washington upon such plans and from such places as he may direct." Having thus placed the work under the special direction of the President, Congress continued to appropriate money for the work without further designation as to its superintendence, until the last session, when it became apparent that the Administration had lost the confidence of Congress. A Presidential election was approaching, and the completion of the Aqueduct was in great peril of delay, if not of total loss.

The debate in the Senate, June 21, 1860, in which Mr. Toombs and others took part, will sufficiently prove that without some special provision against abuse by the Administration, the appropriation would not have been granted by Congress. It was after sharp debate, extending over several days in the House and Senate, finally passed in this form :

1860, June 25, chap. 211. For the completion of the Washington Aqueduct $500,000, "*to be expended according to the* PLANS *and* ESTIMATES *of* CAPTAIN MEIGS, AND UNDER HIS SUPERINTENDENCE." Unless words in A. D., 1860, bear a meaning different from that attaching to them in 1853, this last law places the work as completely under the direction of Captain Meigs, as the first did under that of the President.

On the 17th of July, 1860, the Secretary of War issued an order after some weeks consideration, which will be found in the AMERICAN GAS-LIGHT JOURNAL for August 1, 1860, page 45. By reference to this shrewdly-worded order, it will be seen, that while intended ostensibly to conform to the law, its effect was really superseding Captain Meigs, and placing him in the position of a mere pay-clerk under another officer, and this upon a work of the first engineering construction in the country, that is nearly completed, and is entirely the product of his own labor, skill and knowledge, without embarrassment or aid from other engineers or associates, or as consulting engineers.

As for the plea that Congress had not the power to commit a special charge or trust to an officer by name, it is hardly within the province of the Executive to urge it; and besides, the President approved the law, after openly expressing his views of its details, and further, he has accepted the money upon the conditions prescribed by the appropriating power, and for him now to attempt to expend it, pleading that the condition is void and of no effect, is somewhat like borrowing money, and then pleading usury to avoid its payment. Superintendence of a work is a trust; positive, real, and full of responsibility; and when coupled with the important financial trust embraced in this, it is the unmistakable duty of the Superintendent to see that his hands are not converted into cats'-paws to waste, lose or mis-apply it. Supposeable as is almost anything at the hands of the present administration, it was still hardly to be supposed that it would really attempt to coerce the Superintendent of the Washington Aqueduct. But should it yield to bad counsels, and attempt it, it was not difficult for those who knew Captain Meigs to foresee the result. Under any circumstances, it is the Legislature and not Captain Meigs who would be in that case the party assailed. That he would stand firm to his post we need not say we hoped—for we knew it.

An officer of the army, on resigning, abandons not only his present engagement or occupation, but absolutely his profession, and no officer of the army whom Congress has honored by a special trust, should resign or abandon it, especially when the attack comes from the very source against which he was commissioned to protect it. Captain Meiggs stood firm.

After some weeks of conference between the Secretary of War and the President, in which the rub to be circumvented, was how to get at the funds without the signature of the disbursing officer designated by Congress, it was determined to hazard a *coup d'argent*, and as a prelude to a Department order, the following telegrams were inserted in the pliant New York organ of this corrupt administration :

WASHINGTON, Sept. 20.

The War Department has relieved Captain Meigs from all the duties assigned him in the special orders of July. He is directed to immediately turn over to Captain Benham, chief engineer of the Washington aqueduct, all the books, money, plans, &c., pertaining to the same in his possession. Captain Meigs is also relieved from the charge of the construction of Fort Madison, and assigned to the charge of the construction of Fort Jefferson, Garden Key, Florida, and will enter upon the performance of his duty as soon as practicable. The disbursements on account of the Washington aqueduct and Potomac water works will hereafter be made by Captain Benham.

The army order appeared in due form a few days subsequently, and true to his duty and his dignity, this officer took his departure at the earliest possible moment, whereupon the following official announcement was made :

Captain M. C. Meigs, corps of United States Engineers, having been ordered by the Secretary of War to relieve Captain D. P. Woodbury of the command of Fort Jefferson, Garden Key, Florida, arrived there in the steamer Magnolia, Captain Crowell, on the 7th Oct. The transfer of the charge of the fortifications from Captain Woodbury to Captain Meigs took place on the 10th Oct. Captain Woodbury returns to Washington.

Shortly after this contemptible sacrifice of an honorable man and faithful officer by a relentless "old Public Functionary," as the President calls himself, Captain Benham availed of some excuse to wash his hands of the dirty gold which he discovered himself to be the mere tool for bringing to others, and requested to be relieved from the service at the aqueduct, on the ground that his duties at Fort Madison required his sole attention. Thereupon the Secretary of War and his master having again put their heads together, ordered Lieutenant James St. Clair Morton, on his return from the survey of the Chiriqui route, to succeed Captain Benham as engineer in charge of the Washington aqueduct.

If the old Public Functionary will just refer his conduct in this persecution of a deserving officer of the army to his Attorney-General, he may hear something not particularly flattering to his own side of the case. In a recent opinion on the powers of the President in the event of Secession, addressed to the President in reply to an official inquiry, the Attorney-General says :

The acts of Congress sometimes give the President a broad discretion in the use of the means by which they are to be executed, and sometimes limit his power so that he can exercise it only in a certain prescribed manner. Where the law directs a thing to be done, without saying how, that implies the power to use such means as may be necessary and proper to accomplish the end of the legislature. *But where the mode of performing a duty is pointed out by statute, that is the exclusive mode, and no other can be followed.* The United States have no common law to fall back upon when the written law is defective. *If, therefore, an act of Congress declares that a certain thing shall be done by a particular officer, it cannot be done by a different officer. The agency which the law furnishes for its own execution must be used, to the exclusion of all others.* For instance, the revenues of the United States are to be collected in a certain way, at certain established ports, and by a certain class of officers; the President has no authority, under any circumstances, to collect the same revenues at other places, by a different sort of officers, or in ways not provided for.

If the President has no power to collect the revenues by a different sort of officers than those designated by Congress, *he has no authority to disburse money by any other officer than the one designated and named, as in the present case.* And if the War Department of the present administration has been the most corruptly managed of any since the foundation of the government, it is probable that the fact will be lost sight of in the present political disturbances that agitate the country; and here may be the safety of the shameless perpetrators of the fraud, and of this oppressive conduct towards a gallant officer.

As the new administration will relieve President Buchanan and Secretary Floyd on 4th March next from further duty, Lieutenant Morton will then find his position an honorable as well as an agreeable one, we hope, from association with more congenial superiors than he is subject to at present.

THE ELECTRIC LIGHT APPLIED TO SURGERY.—One of the greatest obstacles to the success of a surgical operation is the scanty and imperfect light which, in some cases, is the surgeon's only guide, and is fraught with danger to the patient. Thus the extirpation of a naso-pharyngian polypus is performed in almost absolute darkness, it being impossible to bring a common light near enough to the patient without scorching him. The problem, therefore, of finding a light which might be introduced into a cavity with impunity, remained still to be solved; and from a communication sent in a few days back to the Academy of Sciences by MM. Th. Doumoncel, Foussagrives, and Ruhmkorff, it would appear that this desirable object has at lenth been attained. Dr. Foussagrives having long entertained the idea that the electric light might be advantageously applied to the purpose, communicated his views to M. Doumoncel, a distinguished electrician, who, calling to mind the effects of electricity *in vacuo*, as exemplified in Giessler's tubes, which although traversed by the electric light, reveal no increase of temperature, conceived the following plan for turning this circumstance to account in surgical cases of the nature alluded to. A glass tube, having a very small bore, is bent into the form of a helix or screw (the smaller the bore the greater the brilliany of the light): by this means a kind of luminous cylinder is formed, which is sufficiently small to be conveniently introduced into a narrow cavity. Thus the first part of the problem was solved; but the color of the light was yet to be determined, since this depends on the nature of the gases introduced into the tube. As mixtures of certain gases, such as carburetted hydrogen, carbonic acid, hydrochloric acid, &c., will produce a white light, nothing remained but to fill the tube with such a mixture; and this delicate operation was intrusted to M. Ruhmkorff, who at the same time introduced other valuable improvements into the apparatus. The latter has since been fairly tried in various dental and other operations. —*Chemical News.*

THE MANHATTAN GAS-WORKS AS A METROPOLITAN WATER-WORKS.—On the bursting of the great Croton mains in Fifth Avenue on 5th inst., the President of the Manhattan Gas-Light Company notified the St. Nicholas, Metropolitan, Clarendon, Fifth Avenue, and Albermarle Hotels, the Everett House, and the citizens generally in the upper part of the city, that water could be obtained in any quantity, free of charge, at the 18th street station of the Manhattan Gas-Works, where two of Worthington's steam pumps were in operation, throwing 120,000 gallons of water per hour. The well from which this water is drawn is about fifteen feet in diameter by thirty feet deep, sunk in a bed of gravel, directly in the course of the old Knapp's Spring Water, which used to supply the city, and has been at times pumped at such a rate as to dry up the private wells as far distant as Union Square.

These Worthington pumps at the gas-works have raised 90,000 *gallons of water per hour for* 120 *days and nights without stopping.* They work to a charm.

It may be as well to state that the St. Nicholas and Fifth Avenue Hotels make their own gas, although they have the Manhattan's gas-meters standing idle on their premises, and if this offer to supply them with water in this emergency was not "heaping (gas) coals of fire upon their (publican) heads" it was something very near it, even if the coals were in the shape of drops of water.

PLAINFIELD, N. J.—Gas-works are being erected by Mr. B. M Johnson, of No. 111 East 18th street, in this city. We hear that they are soon to be lighted up, and have no doubt they will do Mr. Johnson great credit. He is indefatigable in his efforts to that end.

PORT JERVIS, N. Y.—These Gas Works are in successful operation, with 100 consumers. Iron retorts, from Starr, of Camden; N. J.; gas holders of 10,000 c. f. capacity, P. Daily, Philadelphia; station and customer meteas of J. Lening & Co., 2¼ miles in length; expect to have street lamps in the Spring. H. H. Farnm, Pres.; A. P. Thompson, Treas.; T. Marion, Supt.-Sec.; E. A. Coen, Engineer.

BURSTING OF THE GREAT CROTON MAINS.

At about eleven o'clock on Wednesday night, Dec. 5, the two 36-inch main pipes which convey the water from the Receiving to the Distributing Reservoir, in this city, gave way at a point on the Fifth Avenue, between sixty-fourth and sixty-fifth streets, directly opposite the old State Arsenal, and within fifteen minutes the Distributing Reservoir was emptied, and a chain of inland seas on a small scale was inaugurated in the sunken squares of lots in that vicinity.

Information of the disaster having been promptly conveyed to Mr. Alfred W. Craven, Engineer-in-Chief of the Croton Aqueduct Department, at his residence in West Nineteenth street, he was on the ground in a few moments with a gang of men, which numbered some two hundred, by twelve o'clock.

Immediately upon receipt of the intelligence of the accident, the Mayor dispatched the following communication to the General Superintendent of Police:

MAYOR'S OFFICE, NEW YORK, Dec. 6, 1860.

SIR—The withdrawal of the usual supply of water by the Croton Department renders it, in my judgment, necessary that as large a police force as can be prepared for the purpose shall be stationed in the lower, or business part of the city, to protect the property of the merchants in case of fire. I therefore respectfully recommend that you give the necessary orders to this end, with as little delay as practicable.

I am, yours, &c.,
FERNANDO WOOD, Mayor.

JOHN A. KENNEDY, Esq., Gen. Superint't Police.

The General Superintendent of Police, who had heard of the accident at an early hour in the morning, at once issued an order to the Captains of the lower districts to be particularly watchful as to fires, and have a full force of men on hand in case of any conflagration. He also waited upon the Croton Board, and at his suggestion an order was issued directing all persons who had heretofore used the Croton for manufacturing purposes to discontinue it until otherwise advised, and Mr. Kennedy was duly authorized to cause the arrest of all persons violating the order. Armed with this, officers were dispatched in every direction to give notice of the order, and with orders to arrest every person found violating it. Every precaution was thus taken to prevent a waste of the water still in the pipes.

The following is the order issued by the Croton Board:

NOTICE—In consequence of the breaking of the main water-pipe on Fifth Avenue the water supply is much reduced. Persons residing in the central part of the city can obtain water from the hydrants in Third Avenue down as low as Fourteenth street, and in Eighth Avenue as low as Forty-second street, and in the Ninth Avenue from Forty-second to Fourteenth street. The hydrants will be opened by the Water Police for this purpose. The utmost economy will be necessary to insure even a limited supply for domestic purposes. During this period the supply for shipping, manufactories, &c., will of necessity be cut off entirely.

By order of the Board,
THOS. STEPHENS, President,
A. W. CRAVEN, Chief Engineer,
THOMAS B. TAPPEN, Assistant-Commissioner,
Croton Aqueduct Board.

THURSDAY, Dec. 6, 1860,

The semi-annual examination of the Croton Aqueduct which was to have commenced on Wednesday, is postponed for the present, as well on account of the unfavorable state of the weather, as by reason of the accident.

On Thursday morning the greatest inconvenience and alarm was suffered by our citizens. The water continued to run in diminished and feeble streams at the lowest points of the city, chiefly at the street hydrants and in cellars where stop-cocks were attached, and it was at once ludicrous and remarkable to see women and men carrying buckets of water through the streets obtained at the fountains and hydrants for the immediate necessities of families.

Steam engines attached to manufactories were stopped entirely, and large numbers of operatives temporarily discharged, while the boilers belonging to the daily newspapers were supplied with water brought in carts from the neighboring cities of Brooklyn, N. Y. and Jersey City, N. J. The Manhattan Gas Works opened their wells to the public, as did Moller's Sugar Refinery and other fortunate possessors of living springs.

The mains were reached between three and four o'clock on Friday morning, 7th inst. About half the length of a nine-feet section in each pipe was found to be broken, and irregular pieces, several inches in width, had been forced out from the sides of the pipes lying nearest each other. The supposition is, that a small leakage began from one of the pipes, and that the foundation upon which they rested becoming softened, the pipes gave way from the pressure above. The comments of a morning paper that the avenue at this point had been "filled up with a crushing quantity of rocks," was not based on correct information. The new filling was of the proper contracted materials. The pipes are supported by masonry, a pier of which is placed under each joint, making them a little more than eight feet apart. The piers measure one by one-and-a half feet where the main rests, enlarging somewhat toward the base. The foundation upon which these rest being alternate rock and swamp, it will be seen that disasters like the present are not unlikely to occur at any time.

The Croton Board are considering the propriety of laying new pipes next Spring, at a proper depth, as it is thought it would prove a losing operation to dig up the old ones. The pipes are of cast iron, with insertions similar to a stove-pipe, being soldered together at the joints, and are divided off into sections 12 feet long, 1 inch thick, with 3 feet interior diameter.

The scenes about town on Thursday, in consequence of the Croton deficiency, were less exciting than those of the day previous; the supply was somewhat increased, and by resort to basements a stinted supply was obtained for domestic purposes. The printing offices and manufactories employing steam power, sent to Brooklyn and Jersey City for supplies. The water resources of these cities are very considerable. The Ridgewood Aqueduct in Brooklyn receives its supplies from outlets of several ponds and springs, that are intercepted on their way to the Atlantic. The largest of these ponds is known as Cornell's Pond, and covers an area of 37 acres. The capacity of the reservoir is 170,000,000 gallons, and the supply brought from the Aqueduct amounts to about 20,000,000 gallons daily, but can be increased. Jersey City is supplied with excellent water from the Passaic River. The Distributing Reservoir on Bergen Hill, two miles from Jersey City, has a capacity of 45,000,000 gallons, with a delivery at the present time of about 2,000,000 gallons daily.

The Water Commissioners of Brooklyn afforded every facility in their power in supplying the residents of New York with Ridgewood water. Hose was attached to their hydrants at all the ferries, so that all who came could be supplied, and at the South Ferry a tank was constructed, from which water could be dipped without difficulty. Large numbers of persons, with buckets, cans, pitchers, etc., came over during the day. In view of the demand, the Commissioners directed the pumps at Ridgewood to be worked constantly, so as to have a sufficient quantity in the Reservoir to supply not only the wants of Brooklyn but of New York, or as much as may be required. It is estimated that ten million gallons daily can be supplied from the Ridgewood Reservoir, in addition to that which will supply the wants of Brooklyn, under ordinary circumstances. Permits were not required, and all who wanted water could get it.

Two men were stationed at the Fulton Ferry, and one at each of the other ferries, to facilitate persons in obtaining water.

The following letter was received by Mr. Hance, the Registrar of the Croton Aqueduct Department:

NEW YORK, Dec. 7, 1860.

R. C. HANCE, ESQ., REGISTRAR—SIR—We desire to inform you that we have at our refinery, corner of Corlaer's and Water streets, a well of sixteen feet diameter. We keep steam on night and day, and can supply 30,000 gallons of water per hour, and respectfully tender the use of the same to your department for extinguishing fires during the present emergency.

Yours respectfully,
MOLLERS, HOGG & MARTENS.

Mr. John D. McCreary of No. 333 Stanton street, has also a steam engine with suction pipe, all the time fired up, which he placed at the service of the Board.

The Chief Engineer of the Fire Department issued the following notice:

OFFICE CHIEF ENGINEER FIRE DEPARTMENT,
NEW YORK, DEC. 7, 1860.

STOPPAGE OF THE CROTON WATER—It is particularly requested by the Chief Engineer that merchants or others having clerks, porters, or private watchmen in their employ, to station them about their premises with their keys, in order that speedy access may be obtained to the various buildings in case of fire during the continuance of the difficulty.

JOHN DECKER.

In Jersey City, Chief Engineer French caused engines Nos. 2, 4 and 5, to be sent to this city, together with a large quantity of hose for use in the lower part of the city in case of a serious fire, until the supply of water shall be restored.

Mayor Wood, judging from his letter to the Superintendent of Police, as well as his Thanksgiving proclamation, would appear to be getting a little beside himself. His letter to Mr. Kennedy commences with the singular assertion, "the withdrawal of the usual supply of water *by the Croton Department*," &c. How the breaking of a pipe 25 feet under ground could be considered the action of the Croton Department it is difficult to imagine. It will not be an easy matter for his Honor to shift upon other shoulders than his own, the responsibility of this disaster. His course last Summer prevented the work on the Fourth Avenue mains going forward. But for this, they would have been finished before now, and with their capacity to deliver a greater quantity of water than those to which the present accident has happened, this accident, in its effects on the city, would scarcely have been noticed.

A brief statement in regard to the water resources of the city is subjoined:

A vast number of springs in Putnam County, flowing over the surface of that uneven and elevated country, form some twenty small lakes, comprise the sources of the Croton. These lakes are from twenty to twenty-five miles distant from the mouth of the Croton at Tappan Bay, on the Hudson, and cover an aggregate surface of thirty eight acres. From the uncommon purity of the water, the Indians gave a name to the river signifying *clear water*. The Aqueduct through which the water flows is 8 feet 5½ inches in height, and its greatest width is 7 feet 5 inches, giving a sectional interior area of about 53½ square feet.

The foundation is of concrete, the side walls of stone, the bottom and sides of the interior being faced with brick, and the top covered with an arch of brick. With the exception of crossing Harlem River by means of pipes at the High Bridge, the water passes through this channel-way of masonry from the fountain Reservoir on the Croton to the Receiving Reservoir at Eighty-sixth street—a distance of 38 miles. It is calculated that the Aqueduct will convey 60,000,000 gallons in 24 hours. The velocity of the water has been ascertained to be nearly one and a half miles per hour. The Receiving Reservoir in the Central Park occupies the area between Seventy-ninth and Eighty-sixth streets, and between Sixth and Seventh Avenues, comprising 35 acres. It has a capacity of 150,000,000 gallons. The cost of the work, exclusive of the pipes in the city below the Distributing Reservoir, was about $9,000,000.

The placing of the great 7½ foot main over the High Bridge, the completion of the new Receiving Reservoir, which will be 160 acres in extent, and of a capacity of 1,029,880,145 gallons, and the laying of the Fourth Avenue mains, will place our Croton supply on altogether a new basis. The next great work to be undertaken by the city in reference to the Croton, is the building of basins to retain supplies near the Croton Lake to be used in case of long-continued drought.

ARTESIAN WELLS.

Among the wells that have been provided by a few far-seeing citizens to ensure a supply of water at all times for manufacturing purposes, is that constructed by Messrs. Harris, Kuhn & Co., sugar refiners, in Leonard street, between West Broadway and Hudson street. Those gentlemen state that they have two artesian wells, giving a supply of pure water, equal to 200 gallons per minute, or 12,000 gallons per hour. These wells have been in constant use more than six years, and the quantity has not been diminished in any respect. The same quantity of Croton, they say, would cost about $4,500 per annum, to say nothing of its variations in temperature and continuousness of supply. Similar wells have been constructed, not only in the brewery of Mr. Harrison, in Sullivan street, and in the International Hotel, in Broadway, but in Tatham's lead works, in Beekman street; in Ockershausen's refinery, in Rose street; in various breweries and factories throughout the city, and in the United States Navy-Yard in Brooklyn.

In our researches for the historical items of the introduction of water into the city, we find from a document sent to the Common Council in 1833, many interesting facts, the realization of which is brought to our special attention by the accident to the Croton on Wednesday last. This communication sets forth, *in extenso*, the geological structure of the island on which the city is located, and minutely describes many of the wells that then furnished our people with water. Of this number there remains in use, at the present time, one that our readers will find at the corner of Avenue D and Third street. Owing to the superiority of this water for drinking purposes, the well has withstood, for thirty-three years, the innovations and prejudices which the Croton has brought.

We have already said that the broken pipes were reached by the workmen between 3 and 4 o'clock on Friday morning. They were broken up and taken out, and a sufficient space cleared away to put in the two new sections in the course of a few hours. At 4 o'clock in the afternoon, four men were sent into the pipes a distance of some 400 feet each way to ascertain if the pipes had received any other damage.

None was discovered, and the new sections were, by the aid of a derrick, inserted in their places. At 10½ o'clock that night the gate was raised at the upper Reservoir, and water was soon coursing through the westerly main. An hour later, and the gurgling of water in the other was heard. An unusual head of water has accumulated since the accident—in fact, the upper Reservoir is within three inches of being full—and the supply of water was let on to the city during Friday night, so that on Saturday, 8th inst., it was as abundant as ever. The absence of supply was of precisely 48 hours duration.

CAUSE OF THE BURSTING OF THE GREAT CROTON MAINS.

The following letter is worthy of perusal:

At Sixty-fourth street and Fifth Avenue, the original surface of the land was twenty-seven feet below the present grade line. The old road bed was nine feet, and the thirty-six inch main from sixteen to seventeen feet below the grade. Mr. Pettigrew, the contractor, had finished the filling in of this part of the Fifth Avenue, set his curb and gutter, and had but the flagging to lay in order to complete his work.

The broken main was laid under the direction of Horatio Allen, in the early history of Croton distribution. The sub-structure was ample, the casting made by Governeur Kemble, Esq., was as good as any then used. Where laid, the filling was in part of blasted rock, in large masses, and earth. None of the above facts account for the present break, except so far as they have reference to the strength of the casting, from the fact that the rupture occurs in the *side* of the pipe. It was laid in an excavated cut upon a solid settlement of filling, completely compacted; therefore, the casting alone is the point at issue. So far as I observed, the iron appeared in as good condition as over 20 years of exposure, and one inch in thickness could be expected to have left it. Pettigrew's filling through the centre of the Fifth Avenue was of earth taken from near Hamilton Square, and had it been like the sides, of masses of broken rocks, that fact would not have affected the pipe some six feet below his filling.

Abundant provision is now made by the Croton Department, both in the tests applied to pipes previous to being used, in the mode of sub structure, as well as in the size and strength of the material, as will insure safety

in the future, except so far as oxydization may develope imperfections in a casting beyond the reach of ordinary tests.

From all the facts, therefore, so far as developed, the accident is just one of that class that brings no blame upon the Engineer who laid the ruptured main, and yet one that ample provision seems to have been made by the present Department to assure us from in the future.

Experiments within the last ten years, here and in Europe have confirmed the theory of the electrical decomposition of zinc when in affinity with iron. The well-known effect of lead when used in connection with iron, led to experiments, particularly by Professor Antisell. in which the superior destructive power of iron over zinc, when brought in mutual contact, was developed.

Tubular castings are liable to lack thickness on the superior surface, and this fact is somewhat neglected, still in so far as proper guages are used to detect the *exact* extent of such defect, both on the inner and outer surfaces in transverse sections of the tubes.

With the application of one inch thick zinc collars, and say two longitudinal strips as connections, together with application of a proper guage for thickness as above, grilling of three-inch timber, with from six to eight feet bearing at each joint of the main, and this in connection with the usual care at present bestowed upon the tests of pipe and laying of sub-structure, there will be but little room left for any accident short of actual design thereto in the future.

Yours, respectfully,
R. GRAVES, City Surveyor.

ANSWERS TO CORRESPONDENTS.

J. D. of Va.—*The discovery of illuminating gas was made—as so many other discoveries of great importance to the comfort of man have been—in an accidental manner. Van Helmont, an eminent physician and alchemyst of Vilvorden, a town of Belgium, while making some experiments in the early part of the 17th century, subjected a quantity of animal and vegetable matter to the action of heat in a closed vessel. In this manner he obtained a vapor which he termed* gaz fuliginosum ; *but he seems to have had no idea of a practical application of his discovery. A number of years after this the Rev. Dr. Clayton, an English clergyman, subjected coal from Lancashire to destructive distillation, and on observing the inflammable nature of the gaseous product, he collected it in bladders, and thus preserved it for the amusement and edification of his friends, in whose presence he would puncture the bladder, and light the gas as it issued forth. The credit of utilzing these discoveries, however, belongs to Murdoch, a Cornish engineer, who, in* 1792, *conceived the idea of conveying gas through pipes, and thus employing it as an illuminating agent. Mr. Murdoch's house and a few factories were first lighted with gas ; but it was not till* 1813 *that its use was adopted in London, when the oil lamps on Westminster bridge were removed, and gas burners substituted, much to the amazement of the public, who looked upon this innovation as dangerous in the extreme. You will find an abridged history of gas-lighting in the first number of the* AMERICAN GAS-LIGHT JOURNAL, *July* 1, 1859, *page* 9.

E. B. S. of Mass.—*Little's reflector metal consists of—*

Copper.	*Tin.*	*Zinc.*	*Arsenic.*
65·11	30·82	2·24	1·83

F. J. of N. C.—*The plan proposed by Count Rumford for ascertaining the relative intensity of light, is useful only where great accuracy is not indispensable ; as it is almost impossible to observe such slight differences in the shadows as might be sensibly denoted by a more reliable arrangement. The photometer of Bunsen is the best instrument for this purpose, and has been adopted by nearly all of our gas companies.*

L. D. of N. Y.—*The impurity you speak of may be bismuth, a very minute admixture of which almost entirely destroys the ductility of copper.*

C. H. F., of Pa.—*Olefiant gas is sometimes termed* heavy *carburetted hydrogen in contradistinction to marsh gas, which is often spoken of as* light *carburetted hydrogen.*

G. F. C., of Ct.—*The papers on the Practical Management of Gas-Works will be resumed probably in our January 1st number. The writer has been too much engrossed with other matters to permit him to favor us for some time. We hope also to hear from* PLATINUM *and* GLENMORE *again, soon.*

J. S. C., of N. J.—*Your three-cent piece was well invested, as you have seen. We had heard of the piece, but had not seen it before.*

W. F. C., of N. Y.—*You will find the various plans for removing carbon from the interior of clay retorts on pages* 105, 154, 208, *Vol. I.*

BEHAVIOR OF COAL GAS WITH FATTY OILS.—Coal gas is a mixture of elayle with various hydro-carbons, some of which the author supposed might be withdrawn by means of fatty oils, which experiments proved to be the fact. He passed dry coal gas through a potash apparatus filled first with almond oil, and then with lamp oil. The gas was allowed to pass until there was no further increase of weight. The weight of the almond oil was found to be increased by 9·3 per cent., and lamp oil as much as 20·5 per cent. The illuminating power of the coal gas did not appear to be lessened, while that of the lamp oil was considerably increased. Wax, tallow and stearin exposed for some time to the influence of gas seemed to absorb a large quantity of it and to become soft. The above experiments might be turned to account in improving the illuminating quality of the fatty oils. —*A. Vogel, Jr.*

CORRESPONDENCE.

DOES THE QUALITY OF A GAS AFFECT THE REGISTRATION OF THE GAS-METER?

To the Editor of the AMERICAN GAS-LIGHT JOURNAL :

NEW YORK, Dec. 14th, 1860.

Mr. R. G. C., of Louisville, has in your last number answered all essential points of the letter under the above heading, sent in by Clarior e Tenebris from Bacup, England, and it may seem superfluous, after the able refutation of the arguments of our English cousin, to recur to a subject where victory is so easy. But there are certain little matters left untouched, which, in my opinion, require elucidation.

Clarior e Tenebris reasons thus :

A poor gas contains almost invariably a larger proportion of hydrogen, rendering the flame intensely hot, causes the gas to flow proportionately faster from the burner.

Mr. R. G. C. very correctly attributes the more rapid flow to the lesser specific gravity, and states also that this flow is again retarded by the increased heat of the flame *at the burner*, gas expanding by an increment of heat at a larger ratio than the opening of the burner.

Gas, when not burning, escapes from an orifice faster than when burning, and the difference inversely to its illuminating power. I will give a few figures based upon direct experiment. The burner was a Scotch tip, the pressure half an inch.

Illuminating power of the gas in English Sperm Candles.	Consumption of gas per hour in cubic feet.		Increase in per cent.
	When burning.	When not burning.	
9·95	2·016	2·750	36·4
15·	2·304	2·694	12·5

The increased retardation in the flow of burning gases, of low illuminating power, can be easily explained by the structure of the flame. It consists, near the orifice, of one portion which is burning, and another one which is simply heated, and which, by carefully inserting a narrow glass tube in the centre of the flame, can be drawn out and burnt separately. This heated portion of gas must be largest in gases of high illuminating power. They contain a larger proportion of carbon and hydrogen than poor gases, and the access of atmospheric oxygen being the same in both cases, the combustion cannot penetrate so far into the interior of the flame. Of poor gases a smaller portion only is left unburnt near the orifice ; the combustion penetrates further, causing thereby the increased temperature of the burner, and the consequent retardation in the flow of gas.

But Mr. Clarior e Tenebris makes a grave mistake in ascribing to the *whole* flame of poor gases an excess of temperature over rich gases, and in tracing the cause to the larger proportion of hydrogen. To begin with, poor gases have *not* a larger proportion of hydrogen ; they may have more *free* hydrogen, but do the hydrocarbon gases, besides their carbon, not contain hydrogen also, and even several volumes condensed into one?

One volume of marsh gas consists of ½ volume of carbon vapor and 2 volumes of hydrogen condensed into one ; olefiant gas of 1 volume of carbon vapor and 2 volumes of hydrogen condensed into one ; dietryl of 2 volumes of carbon vapor and 4 volumes of hydrogen condensed into one, and this condensation into one volume increases with the specific gravity of the hydrocarbons. How, then, can the heat produced by the combustion of a rich gas, being in proportion to the amount of carbon vapor and hydrogen, be less than of a poor gas? *The power of a gas is in fact very nearly proportionate to its illuminating power*, and the observation by Prof. Mapes of the remakable heating power of water gas, with its *peculiar* illuminating power before the rosin was turned on, and recent attempts to introduce gas of no illuminating power for heating purposes, will certainly leave the public not only in the dark, but also in the cold.

The enormous heat produced by the combustion of hydrogen is an illusion too, because in burning gases we have not to deal with weights but with volumes. One cubic foot of hydrogen produces little more heat than one foot of carbonic oxide, and nearly five times less than one cubic foot of olefiant gas. If we express the heating power of a gas by the weight of water, which can be raised from 32° F. to 212° F., we have the following relation :

One cubic foot of hydrogen,	2·22	pounds	1,00
" carbonic oxide	2·16	"	0·97
" marsh gas,	6·71	"	3·02
" olefiant gas,	10·74	"	4·83

C. S.

LIGHT AND WATER IN HAYTI.

UNITED STATES CONSULATE,
AUX CAYES, HAYTI, Oct. 23, 1860.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL :

I have the pleasure to acknowledge receipt of your valued favor of August 10, together with your AMERICAN GAS-LIGHT JOURNAL, forwarded to me by the Honorable Secretary of State. There being no opportunity direct, I send this *via* Port-au-Prince. For the information you seek concerning gas-light and water companies in this place, I have only to say that, as yet, we are not blessed with either.

There was a talk some twelve or fifteen months ago of having the city of Port-au-Prince illuminated with gas, but all of a sudden the project has fallen to the ground. In this city the streets are bad enough and they are not illuminated ; the only article in use generally is the common lamp-oil, which is imported from the United States ; the natives make an oil from the Palma Christa and the cocoa nuts, but in such small quantity as to be unworthy of mention. I am trying to introduce the Kerosene oil : I have already lamps adapted to the purpose, and they seem to take pretty well. I give you tha prices of illuminating materials : Palma Christa, in small quantity, costs about $1 40 per gallon ; cocoa nut oil $1 15 per gallon of our money.

For rosin and turpentine, these articles are imported from the United States, and the former costs here 24 to 25 cents per lb., and the latter $2 10 to $2 12 per gallon. There has been a coal mine discovered twenty miles from this city, but the samples that I have seen are not worth much, although they think that they will succeed in exporting it ; but it requires a large capital, and even then I have my doubts whether they will ever be able to sell the coal as cheap as in St. Thomas and other places. The Haytians in general are very indolent, and without energy ; if this question of illuminating cities—say in Port-au-Prince, Cape Hayti, Jacmel, here and Jeremie—was started by some of our enterprising countrymen with a capital, I think money could be made out of the operation. We have also a good deal of water, but no hands to work. I am translating your JOURNAL into French, and when it comes before the public this may do some good. I will write you again on the subject.

I shall be most happy to hear from you at any time. —Ever, dear, sir,

Very truly yours,
RICHMOND LORING,
U. S. Consul.

WATER-WORKS OF AMERICA.

WATER-WORKS OFFICE, ST. LOUIS, MO.,
November 27, 1860.

To the Editor of the AMERICAN GAS LIGHT JOURNAL :

I hasten to reply to your communication, and will state that our works consist of two high pressure direct-action engine and pumps, of the following dimensions : steam cylinder, 30 inches diameter, 10 feet stroke ; working pumps, 22 inches diameter, same stroke, laying on an inclined plane. We have a battery of ordinary high pressure double-flued boilers to each engine, 42 inches diameter, 28 feet long, six in a battery ; work our steam from 80 to 90 lbs. to the square inch, using a 3-8th cam cut-off ; work our engines and pumps without push or steam from 14 to 16 strokes per minute, week after week, running night and day. We lift our water by suction 25 feet, and force our water through a 30-inch main pipe. 9,500 feet to the reservoir ; extreme lift from river to high water line in reservoir, 175 feet. We pump ordinarily 7,000,000 gallons of water per day with each engine ; can throw easily by *actual measurement* 15,000,000 gallons into an empty reservoir in twenty-four hours. We consume from 23 to 25 bushels of coal to each engine per hour. The difference on the pressure-gauge of the pumps, running or standing, is 5 lb. per square inch ; with both running or stationary, 10 lb. per square inch. This is the pressure on the main pipe at 15 revolutions per minute, pressure at pump 75 lb. per inch. Our reservoirs are made of rubble masonry lined with hard brick, laid in cement, supported by a strong embankment of earth. The reservoirs are 520 feet long by 250 feet wide in the clear, and 45 feet deep ; extreme depth, 50 feet.

We have 75 miles of iron pipe ; ascending main, 20 inches diameter ; descending mains, two, of 20 inches diameter ; smallest pipe used, 3 inches diameter. Have 1,000 fire-plugs, 6-inch pipe, with 3-inch nozzles for steam fire engines.

Cost of operating our works—fuel, labor, repairs, &c. —is $36,000 per annum ; receipts, $150,000. We work our engines semi-monthly, one being sufficient for consumption at this season. We use clapper-valves faced with leather, so arranged that we can renew them in a few minutes. Our steam cylinders have metallic packing ; we pack our pumps with hemp ; the pumps have large, circular air chambers, in the form of an arch, connecting both ends of the pump, which enables us to run at *our high speed* with little jar. The steam piston is connected with crank and fly-wheel at one end, and piston of pump at the other, the pumps being double-acting.

Very respectfully, yours, &c.,
WILLIS R. PRITCHARD.

DARKNESS IN JAPAN.

LEGATION OF THE UNITED STATES,
Yedo, Japan.

MY DEAR MR. MURRAY :

"Yedo is 213 degrees longitude east of New York." This geographical fact may in part explain to you why it is that I am only * now able to reply to your very acceptable letter of December 7th.

Many thanks for your amusing chapter of gossip—most of my letters are filled, not with such agreeable matter, but with demands so various, that it would require a forty "Admirable Crichton" power, to answer them.

The Japanese do not use gas, consequently they have no gas-works,—they use vegetable oil and wax for their lighting,—there are no street lamps,—oil and wax are

*Our friend does not say when now is. There is no date to his letter.—ED.

very cheap, and as the Japanese go to bed with the hens and rise with the larks, the expense of light is infinitesimal.

By this time you have doubtless seen the Japanese Ambassadors. I look on the sending this embassy as the crowning of my work in this country, and I shall be but too happy when I am relieved and permitted to return home.

By the way, I pray night and morning that my Japanese friends may escape from the United States without being blown up in a steamboat—smashed in a railway—killed by a surfeit—or "chawed up in a free fight."

The nearest Americans I have as neighbors are at Kanagawa, 17 miles distant. There are now some 70 of our compatriots at that place, among whom are five missionary families, the rest are engaged in trade. The exports from this country are chiefly raw silk, tea, vegetable wax and oils. Some flour, peas, sea-weed (beche-le-mer), and similar articles, are shipped to China. The resources of export trade have proved to be far greater than I expected, as full five millions of dollars were exported in the first year, i. e., July 1, 1859, to June 30, 1860.

This country is rich in latent resources, and in a vast population that is willing to have profitable employment.

Nothing of any importance has as yet been done in imports, and this must be a work of time. New wants must be created among the masses before any considerable import trade can arise.

My neighbors in Yedo are only the members of the French and English Legations resident here. My intercourse with my colleagues is (and has been) of the most agreeable kind.

Yours, ever sincerely,

TOWNSEND HARRIS.

John B. Murray, Esq., New York.

THE SANDERS WATER-GAS.

To the Editor of the AMERICAN GAS-LIGHT JOURNAL :

SIR,—Among the lessons taught to us in youth, there are few, the conviction of whose truth is more frequently forced upon us in after life, than that one from which we learn that—

> "Envy does merit as its shade, pursue,
> And like the shadow, prove the substance true :"—

and among the many evidences of its truth that now meet us on every side, there are few that are more conclusive than that presented by the case of Dr. Sanders.

Had his process not possessed the merits claimed for it, would not its opponents have gladly sided in its production before the world, that its demerits might thus be clearly proved? Have they done this? Have they not on the contrary, done everything in their power to prevent the public from having an opportunity to judge of its merits for themselves?

Had it proved a failure, would it be necessary to be now expending thousands of dollars of the public money in the circulation of "sensation articles," dictated by themselves, and produced in Scientific (?) Journals of other cities?

Had it not possessed the merits claimed for it by Dr. Sanders, would persons connected with our city works have ventured to insist upon the payment of the enormous sum of $150,000, as a condition precedent to the production of a favorable report upon it?

Had it not been *perfectly successful*, would Dr. Cresson have so promptly sought to connect with it the unsuccessful retort for which he held a patent?

Were its merits not very great, would the proprietors of other unsuccessful machines exhibit the anxiety to follow in the footsteps of that gentleman which is manifested in the following letter, received a few day since?

(COPY.)

ALBANY, Nov. 26, 1860.

H. C. CAREY, ESQ.:

DEAR SIR,—I am now prepared to publish in the AMERICAN GAS-LIGHT JOURNAL and *Scientific American*, a detailed statement of our apparatus described in N. Aubin's patent of 1854, and of our mode of operating the same, viz.: 1st. Filling the retort with sawed pieces of wood, and then converting that into pieces of charcoal, before running into the retort upon and through the charcoal, the vapor of rosin and the steam—said rosin and steam being conducted into one and the same retort, and then decomposed in the presence of each other and of the red-hot charcoal.

As the above statement, accompanied by the affidavits of the agents and engineers operating the works, when once published, will greatly embarrass any settlement which you may hereafter desire to make with us, I have thought it best to give you notice of what we feel compelled to do, unless you purchase from us the rights which we claim you are infringing on. These rights we will sell for a moderate sum, as our object is certainly not to embarrass you, but to protect what we consider our just rights. There can be no question that Aubin's apparatus, doing precisely what Sanders claims, was operated at Cincinnati, long before Sanders made his experiments, and we date long before the Cincinnati work. You say his system differs entirely from Aubin's, as you have been informed by parties using the latter. I again remind you that the Aubin Works, thus referred to, are under later patents, and not under the patent of 1854—the apparatus described in that patent being an oblong coal-gas shaped retort, into which the rosin and steam were introduced. I will delay a reasonable time for your reply.

Very respectfully yours,

(Signed) H. Q. HAWLEY,

Pres't of the A. G. W. Co.

For many months past, both personally and by letter, the writer of this has sought to persuade us to the belief that his unsuccessful *machine* had been, in some unaccountable manner, interfered with by a *process* that had been so entirely successful as to have excited the ire of those who thought their purses likely to be injuriously affected by it. That no such interference could be found on the face of the patents was clearly obvious, but in reply to this objection we have been told that a re-issue of the Aubin patent would be soon applied for, by means of which such interference would be produced. At once he was invited to make his application at the Patent Office—thereby enabling us to show, as we are ready to do, that *not only are the processes different, but that the products are so entirely different as fully to account for the failure of all the efforts of Mr. Aubin to produce a cheap supply of light.* This reasonable request having been declined, and the declination having been accompanied by a threat, several times repeated, that if he could do no good to himself he could at least damage the patent of Dr. Sanders, we deem it best to lay this closing letter of the correspondence before the public, desiring in this manner to furnish evidence of our disposition to resist any and every effort at black-mailing Dr. Sanders, or his representatives, in this or other States.

The real value of his discovery would long since have been settled had it been possible to induce his opponents to accept our repeated offers to unite with us in the appointment of scientific men charged with the duty of reporting upon the relative advantages and disadvantages of coal and water gas. Happily the control of this matter is now likely to pass into other hands—the Gas Committee of the City Councils having listened with favorable ears to our proposition to submit the whole question to two gentlemen possessing all the qualifications, scientific and social, required for giving value to their decision. This is what should have been long since done, and would have been, could we in any manner have influenced the action of our opponents.

HENRY C. CAREY,
MARMADUKE MOORE,
A. HART,
} *Committee.*

Office of Keystone Gas Co.,
Philadelphia, Dec. 13, 1860.

GAS-METER FLUIDS.

The question, which is the best liquid for wet meters, will be of interest to gas companies and gas consumers as long as the wet meter holds its present high position as an accurate and reliable apparatus for measuring the consumption of gas. The great inconvenience experienced in cold weather by the freezing of the water in meters, and the consequent stoppage of the gas, have been the chief cause of the substitution of other liquids and of the introduction of dry meters, but it cannot be doubted that gas companies would readily dispense with the use of the dry meter, as at present constructed, altogether, if a liquid could be found possessing all the qualities necessary for a reliable registration of the gas by wet meters in all kinds of weather.

We intend to discuss shortly the value of the liquids which have from time to time been offered to and used by the public as meter fluids, making their value dependent upon the following four necessary conditions:

1. The fluid should keep its level.
2. It should not freeze in cold weather.
3. It should be very thin and movable.
4. It should not corrode the meter metals.

ALCOHOL.

The second condition, that the liquid should not freeze in cold weather, seems to be the only one of any interest to the general public, and as strong alcohol is known to remain fluid in the severest cold, it has been used extensively as a meter fluid in winter. Being lighter and more movable than water, it appeared to be just the thing. But it does not keep its level, and owing to its great affinity for water, with the vapor of which the gas is usually saturated, it retains most of that water and is itself vaporized by the gas, and as the quantity of the alcohol taken up exceeds the quantity of the water retained, the level gradually sinks, and the alcohol gets weaker and weaker. Though this defect can be remedied by temporary additions of strong alcohol, another and far more serious one makes its appearance, when the cold weather has passed away.

The meters are then filled up with water to their proper level, thus diluting the alcohol still further, and as atmospheric air will occasionally find its way into them, particularly in summer, when the gas is used very little or shut off entirely, we have all the conditions for the conversion of this weak alcohol into *acaic acid*. Though we had no occasion to prove this fact by direct experiment, it nevertheless is not only true according to theory, but seems to be proved also by the circumstance that meters, which had been filled with alcohol in winter, are found corroded.

CHLORIDE OF CALCIUM.

The corrosive action on the meter metals also forms the chief objection to the use of salt solutions, among which *chloride of calcium* or mixtures of *chloride of calcium*, *chloride of zinc* and *protochloride of iron* rank highest.

Having great affinity for water, they do not, if made of a proper specific gravity, evaporate sensibly in summer, when the temperature of the meter exceeds that of the mains; neither do they freeze in the severest cold, and it is even claimed for them with perfect truth, that in an atmosphere of coal gas they will be harmless to the meter metals, their injurious action being possible only in the precence of atmospheric air. But will chlorides, coming in contact with the screens of the meters, not attack them, and if they do not cause an actual leakage, will they not open an ever ready way for the exchange of gases on account of their diffusive power? Will not atmospheric air enter constantly, and when the meter is not in use, be soon present in a proportion large enough to start the injurious action of the chlorides?

There is another cause why meters, in which chloride of calcium solutions have been used, are found corroded.

When meters get out of order, the liquid is poured out, and they are put away for repairs. The chloride of calcium remaining always *moist*, has now ample opportunity to oxydise the meter metals in the presence of atmospheric air, and it would not be suprising if most of the mischief could be traced to this source. Such meters, before storing them, should be rinsed very carefully and repeatedly with water, in order to remove the last traces of the salt solution.

CAUSTIC POTASH AND SODA.

Solutions of *caustic potash* and *soda* have been also recommended as meter fluids, and their property of removing small portions of carbonic acid from the gas has been argued in their favor. But as carbonic acid is removed pretty effectually by the scrubbers and wet lime purifiers, and if it were not, only so much of it could be retained as is required to convert the potash and soda solutions into bicarbonates, we do not see any advantage in their use, which would compensate for the injury done to the meter.

GLYCERINE.

Another and perhaps the best meter fluid is *glycerine*. Mr. Henry Bower, of Philadelphia, deserves the credit of having first brought it into public notice. He sent a sample of his glycerine to Dr. Torrey for examination, (May, 1859,) and obtained a very favorable report. The Director of the Gas Company of Augsburg, Mr. C. Bonnet, makes it the subject of a communication to the German Gas Journal, pag. 53, 1860, and recommends it as a liquid which will neither freeze in cold weather, nor alter its level. He placed meters filled with glycerine, which was diluted with one, two and three parts of water, on the roof of a house and exposed them to very severe frost in the winter of 1859–60. They registered correctly.

Glycerine is a syrupy liquid of intensely sweet taste, and of specific gravity 1 28, and can be exposed to the severest cold without freezing. Mixed with one or two parts of water, it is very movable, and presents no appreciable impediment to the easy motion of the drum, withstands the cold, to which gas-meters are usually exposed, does not evaporate sensibly, and does not oxydize the meter metals. Pieces partly immersed in glycerine remained bright, while some of the others, partly immersed in water, were oxydized.

It may be of some interest to the readers of this JOURNAL to learn how far the dilution of glycerine can be safely carried, because its freezing point depends upon its degree of concentration. We insert, therefore, the minutes of the experiments made with the glycerine of Mr. Henry Bower, in May, 1859.

The concentrated glycerine, at 62° F., had a specific gravity of 1190 (water 1000), and it did not freeze, but got thick and syrupy at — 14° F. Mixtures of

Vols. Glycerine.	Vols. Water.	Spec. Grav.	Did not freeze at.
2	1	1130	— 14°
1	1	1000	froze at + 4° F.
1	1½	1080	" + 12° F.
1	2	1065	" + 16° F.

Mr. Fabian, Assistant in the Polytecnical School at Ausburg, made experiments on the same subject last summer, and has published them in Dingler's Polytecnic Journal. Here are his results:

Glycerine of specific gravity.	Percentage in weight of pure glycerine of spec. grav. 1·26.	Freezing point.
1127	50	— 24° to 29° F.
1117	45	— 15° F.
1105	40	+ 1° F.
1075	30	+ 21° F.
1051	20	+ 28° F.
1024	10	+ 30° F.

Crude glycerine contains often a large quantity of bicarbonate of lime in solution, which separates when the liquid is diluted and heated, it also deposits sometimes a flaky precipitate of organic matter. These things can be easily avoided.

GAS-LIGHT ENTERPRISE IN BRAZIL.—Mr. S. S. Battin sailed a few days since, in company with Mr. Marcus Williams, for Para and Maranham, for the purpose of securing contracts for lighting those two cities with gas. Mr. Battin is well known to the gas-light community of America as a competent and successful builder of gas-works, having been identified with the construction of some thirty or forty works, among them Albany, N. Y., Charleston S. C., Monroe, Mich., Newark, N. J., Newburg, N. Y.. New London, Ct., Reading, Pa., Rochester, N. Y., Syracuse, N. Y., Yonkers, N. Y., and others of importance. Mr. Williams, having resided some fifteen years in Brazil, has the acquaintance and familiarity with the language to render his connection a great acquisition to Mr. Battin. These gentlemen deserve success, and we hope they will realize it.

GAS, STEAM, SMOKE,

PURE WATER & SOIL PIPE

FROM

JOSEPH CLIFF,

Wortley Fire-Brick Works, Leeds, Eng.

T. W. PARMELE, Agt.,

No. 4 Irving Place, N. Y.

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The undersigned embrace this opportunity of returning their thanks to the gas-meter manufacturers throughout the United States, for the very liberal patronage they have received for the past ten years, during which they have been established in Philadelphia, which has placed us ahead of all competition. Our sales for the past year have been far greater than we could have anticipated, with the prospects of a steady increase. Our constant aim has been, and will be, to adopt all improved processes of manufacture, combining improvements in quality with reduction in price. All Dials made by us are warranted to be as represented, and of the best materials and workmanship, which will recommend them to all parties wishing the very best. Circulars sent free by mail, or on application.

We are the appointed agents for HUNTER, SHEARMAN & CO.'S make of BRASS PINION-WIRE Gas-meters, which we believe is equal to the best.

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NON-FREEZING AND NON-EVAPORATING

GAS-METER FLUID.

By the use of this Fluid, the WET GAS-METER of ordinary construction is rendered the most perfect and most reliable Gas-Measuring Instrument ever offered to Gas Companies. In winter the Meter will continue to work equally well, *however exposed it may be*; and in summer, the level of the Fluid remaining constant without refilling, the measurement of the Gas will be both uniform and constant.

The use of this Fluid is both easy and economical, and Gas Companies desirous of using it, will be licensed on liberal terms. For further particulars, and certificates of parties having used the same or over three years, and for city rights, apply to

A. DOISY, Box 1180,

General Agent and Attorney for GENGEMBRE'S PATENT.

N. B.—No Sales of Territorial right, or Licenses for using my Patent will be valid, without being ratified by my Signature, as I have no Agent authorized to execute the same.

H. P. GENGEMBRE, PATENTEE,

Box 48, Alleghany City, Penn.

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JAMES HELME, Chandelier and Gas-Fitting Establishment, No. 58, East Thirteenth street, between Broadway and University Place, New York.

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A large and elegant assortment of CHANDELIERS, BRACKETS, &c. Gas-Pipe and Posts made for Gas Companies on favorable terms.

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Water Closet Pans, Wine Basins, Wash Basins, Sinks, Fountains, Jets for public and private purposes, Stop-cocks, Filters, and all other Water apparatus.

Also, a complete assortment of Gas-fixtures Pendants, Chandeliers, Brackets, &c. &c.

MISCELLANEOUS.

BURTIS' PATENT COMPENSATING COUNTERBALANCE FOR GASOMETERS.—This Improvement consists in making the attachment to the Gas-Holder by counterweighs in such a manner as to effectually prevent it from getting out of level so as to bind, and also to prevent any escape of Gas at Cup or Hydraulic seal, where the Holder is on the Telescopic plan. Holders that work out of level, are thus evenly balanced, and prevented from binding or lodging against Tank-wall and falling down, thereby being rendered unfit for service. Where Holders or sections of Holders cannot be used on account of the above difficulties, this arrangement will remove them, and place the Holder in good working order; moreover, with this attachment, deep tanks are not necessary.

BURTIS' COUNTERBALANCE has been in use for three years at the Gas-Works, Chicago, Ill. Its resistance to high winds and snow-drifts, is alone sufficient to recommend its general adoption. For Engravings, see AMERICAN GAS-LIGHT JOURNAL for June, 1860, page 221. Address

P. T. BURTIS,

Engineer Gas-Works, Chicago, Ill

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HOT WATER GAS-STOVES, Manufactured by HUNTER, KELLER & Co., 144 Centre-st., New York.

See Engravings on page 163, Vol. II., of this JOURNAL.

OLEOMETERS.

OLEOMETER, OR HYDROMETER. For Kerosene, Coal Oils, Petroleum and other Distilled Oils. Scale by Dr. Gesner. Manufactured and sold by G. Tagliabue, 298 Pearl street, New York. The specific gravity for every degree of his hydrometer has been carefully taken, and the instrument adapted to the above oils. A table of specific gravities, compared with Baume's scale, a Thermometer and Test-Glass, accompany this new instrument, put up in a neat case—price $5—and it will be found of great importance to manufacturers, and dealers in all coal and petroleum oils.

G. TAGLIABUE, 298 Pearl-st., New York.

WATER HOSE.

LEATHER HOSE, for Fire Engines, Steamboats, Factories, Street Washers, &c., manufactured from the best oak-tanned leather, with wrought-copper rivets, always on hand and for sale by

STEPHEN S. VANDERHOFF,

Late John H. Bowle & Co., 25 Ferry-st., N.Y

CANVAS WATER HOSE—Woven whole and coated on the inner side—a new article, equal to leather even for Fire Engines, where it has been thoroughly tested, costing about one half. For sale in lots to suit purchasers, of all sizes, by

FOX & POLHEMUS,

59 Broad street, cor. Beaver.

DRAIN-PIPE.

DRAIN PIPES, ENGLISH and AMERICAN.

Garnkirk Chimney Tops,

Plumbers' Materials,

Minton's Encaustic Files.

For Sale by

MILLER & COATES,

279 Pearl-st., New York.

WATER-METERS.

H. R. WORTHINGTON'S Patent Water-Meter.—This Meter combines accuracy, simplicity and remarkable durability, with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and indivduals, in many of our largest cities.

HENRY R. WORTHINGTON, 28 Broadway, N. Y.

STEAM-PUMPS.

WORTHINGTON'S STEAM PUMPS, extensively used by Gas-Light Companies, For Sale at greatly Reduced Prices.

Also, a new and highly successful Pump, driven by water pressure, requiring no attention or repairs, and the most economical water motor yet constructed.

Patent GATES, for Water and Steam-stops.

HENRY R. WORTHINGTON, 28 Broadway, N.Y.

BURNELL'S PATENT ROTARY PUMP, adapted to all purposes of Pumping, from the well and cisterns to the steam fire-engine. The most simple, durable and efficient Pump yet made.

Principal sales depot at No. 23 Platt street, New York. SAMUEL B. LEACH.

STOP-COCKS, &C.

DANIEL THOMPSON, Machinist and manufacturer of Stop Cocks, Fire Plugs, &c., for Water-Works, STOP COCKS, VALVES, DRIP PUMPS, &c., for Gas-Works, No. 133, Elfreth Alley, Philadelphia.

GAS-BURNERS.

T. G. ARNOLD, Manufacturer of Gas Burners, Mercury Cups, Portable Sockets, Burner Pillars, &c., No. 447 Broome street (second door west of Broadway), New-York. Imported Scotch Tips and Burner Plyers always on hand

FRD. C. KRAUSE, Manufacturer of Patent Porous GAS-BURNERS for COOKING, IRONING, HEATING, CHEMICAL APPARATUS, &c., No. 772 Eighth Avenue, corner of Fifty-Fourth street, New York.

Sole Agent for the United States,

HORATIO EAGLE, 126 Maiden Lane, N. Y

SCHWARZ'S PATENT STEATITE, or Lava Gas-Burner Tips.—These obtained a Gold Prize Medal in Europe, where they are now extensively used in place of metal tips. In Prof. Liebig's and other Chemists' works, these burners are recommended as *indestructible by acids or alkalies, unchangeable by heat or cold, not liable to rust or corrosion*, and superior in economy to the metal tips. Boston and other cities have adopted them for street lights after a satisfactory trial. They are imported from Germany by the undersigned, sole Agent for America, who can now supply the trade or cities at reduced prices, with any pattern of tips to fit the double cylinder or other kind of burners. For sale also, Large Gas Heating Burners, of same material, for Chemists, &c. W. W. WARREN, 25 Kilby-st., Boston

ORNE'S PATENT FILTER-REGULATING GAS BURNER, admitted by all practical and scientific men, who have examined its movements, to be

THE BEST GAS BURNER YET INVENTED.

They are self-regulating, gas-purifying indestructible, and most economical.

For sale by S. A. STETSON & CO., 350 Washington-st., Boston.

And by HORATIO EAGLE, 126 Maiden Lane, New-York,

See Engravings in Nov. 1, 1860, page 144.

PATENT GAS-BURNERS.—JAS. MCGLENSEY, No. 111 South Eighth streeet, PHILADELPHIA, Manufacturer of Gas-Burners, Meters, &c., respectfully calls the attention of Book-Binders, Chemists, Druggists, Copperplate Printers, Brush-Makers, Case and Cabinet Makers, Hotels and Restaurants, to his Patent Gas-Stove Heating Apparatus, as being particularlarly adapted to their wants—preventing all soiling and injury to the vessels or substances heated, is entirely free from smoke or smell, and highly economical. He refers to the following persons, who have the Apparatus in use:

BULLOCK & CRESLHAW, Nos. 103 & 105 N. 6th-st.

T. S. WIEGAND, Chemist, 15th & Race-st.

F. A. GENTHO, Analytical, 33 Walnut-st

JOS. LIPPINCOTT, Book-Binder, cor. 4th and Commerce-sts.

GASOMETER RIVETS.

PHILLIPS & ALLEN, Pennsylvania avenue, above 22d street, Philadelphia.—GASOMETER RIVETS of all kinds.

MISCELLANEOUS.

PHOTOMETER APPARATUS and Room for Sale.—The Room is about 6 feet wide by 12 feet long, painted black inside and screwed together. It can be taken down and boxed for transportation. All the pipes and fittings are complete for immediate use. Address PHOTOMETER, care of the AMERICAN GAS-LIGHT JOURNAL, 254 Canal Street, New York.

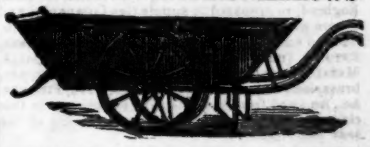
GENGEMBRE'S PATENT GAS-Meter Fluid. It is non-freezing and non-evaporating. Certificates from several companies that have used it may be found in the AMERICAN GAS-LIGHT JOURNAL for December 1st, 1860, page 163. For Sale only by

A. L. BOGART, 592 Broadway, New York.

McKINNY & KELLY,

MANUFACTURERS OF

COAL-SCOOPS & COKE-BARROWS.



FURMAN-St., Near Fulton Ferry, Brooklyn. N. Y.

WOODEN TRAYS FOR GAS-PURIFIERS.—JOHN L. CHEESMAN, No. 147 Avenue C, near Tenth street, New-York, manufactures his Patent WOODEN TRAYS for GAS-PURIFIERS, *cut out of the solid wood*, superior to the ordinary iron plates, cheaper and more durable. The attention of Gas Companies and Engineers is called to this improvement, which has been adopted by the following Gas Works:

Albany, N. Y., Manhattan, N. Y. City,

Chicago, Ill., Philadelphia, Penn.,

Williamsb'gh, N.Y., Worcester, Mass.

See Engravings on page 148, Vol. II.

TO IRON FOUNDERS.—Wanted, Proposals for Castings weighing from 50 to 2,400 pounds. Apply to A. J. WHITE, 10 Cortlandt street, N. Y.

CLAY RETORTS.

CLAY RETORTS.—J. K. BRICK & Co.—Brooklyn Clay Retort and Fire-Brick Works. Van Dyke, near Van Brunt street, Brooklyn, N. Y.—Manufacturers of Clay Retorts, Fire Brick, Gas and Hot House Tiles, Arch, Furnace and Cupola Brick, Fire Cement, Mortar, &c.

J. K. B. & Co. would invite the attention of Gas Companies to the important fact, that the Clay Retorts manufactured at their Works can be set without Tiles, requiring to be supported only at the front and rear ends, thereby exposing the entire surface of the Retort to the direct action of the flame from the furnace.

The results of this mode of setting, are a Saving of Fuel, Tiles, Transportation of Materials, Labor and Space, thereby enabling Gas Companies to set Retorts of at least 50 per cent. greater capacity than those usually employed in the ordinary arches.

ENGLISH FIRE BRICKS, Rufford's Stourbridge Bricks, Stourbridge and Welsh Clay.

S. THOMPSON'S Neph., Imp'r,
45 Gold-st.

ELLIMAN BROTHERS, 217 Pearl-St., New York, Commission Merchants, Importers of

BELGIAN FIRE-CLAY GAS RETORTS,

Dealers in Tiles, Arch-Bricks, Furnace-Doors, Mouth-Pieces, Covers,

and all other Fittings, of the most approved patterns, for setting Clay Retorts.

Sabbaton's Patent Furnace-Doors, & Frames,

Floyd's Patent Malleable Iron Retort Covers,

McKenzie's Patent Gas-Exhausters,

made by Addison Smith. Compensator-Valves, &c. Gas, Water, and Steam Tubes

---

GAUTIER'S CLAY RETORTS.—Fire and Arch Bricks, Gas-House Tiles, &c. Black Lead Crucibles for Steel Works and Brass Founders.

MANY, BALDWIN & MANY, 49 John-st., N. Y.

FIRE-BRICK WORKS, corner of Vine and Twenty-third streets, Philadelphia.

JOHN NEWKUMET,

Manufacturer of all kinds of Fire-Brick, Gas-House Tiles, to suit all the different plans in use. Clay Retorts and Dentists' Muffles. Orders filled at short notice

---

PATENT PYRO-CLAY GAS RETORTS. THOMAS HOADLEY, Patentee, wishes to call the attention of Gas-engineers to these Retorts, as a very superior article.

References:—Gas-Light Works, Buffalo, N. Y.
" " Cleveland, O.
" " Chicago, Ill.

THOS. HOADLEY 34 Front st., Cleveland, O.

ADDISON POTTER,
Willington Quay,

Near Newcastle-upon-Tyne, England,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

COWEN'S PATENT FIRE-CLAY Retorts.

JOSEPH COWEN & Co., Blaydon Burn, near Newcastle-on-Tyne, England, were the only parties to whom a Prize Medal was awarded at the Great Exhibition in London, of 1851, for "Gas Retorts and Other Objects in Fire Clay."

J. C. & Co. have been for many years the most extensive manufacturers of Fire Clay Retorts in the United Kingdom; and orders for Fire Clay Retorts of all shapes and dimensions, Fire Bricks, and every other article in Fire Clay, are promptly executed at their works as above.

COWEN'S GARESFIELD COAL AND COKE.
Coal and Coke office,
Quay Side, Newcastle on-Tyne.

WILLIAM RYDER,
General Mineral and Metal Agent and Merchant, 4 Dean street, Newcastle-on-Tyne, England, is prepared to supply Gas Companies and others with every variety of appliance for the production and supply of Gas, including Gasometers, Retorts (metal and clay), Fire Bricks, Coals, Metal Mains, Tubes, in wrought iron, copper, brass, lead or composition, Meters, Taps, Fittings, &c., &c.; and from his extensive experience in this class of work, can guarantee every thing of the best description.

JOHN ROGERSON & CO., New-Castle on-Tyne, Middlesbro'-on-Tees, London, supply Gas Coal. Clay Retorts, Cast Iron Pipes and Retorts, Gasometers, &c. A partner of the above house being now in this city, will be glad to wait upon any gas company requiring supplies. Agents, MEAD & BELL,
17 William street, New York.

CLIFF'S ENGLISH CLAY RETORTS

Retort-Covers, Gas-Exhausters, Furnac Doors, Castings Implements, Photometrical and Meter-Proving Apparatus.

T. W. PARMELE, Sole Agent,
No. 4 Irving Place, New-York.

CLAY RETORTS.

NEW YORK FIRE-BRICK Manufactory. (Branch Works at Kreischerville, Staten Island.)

B. KREISCHER & CO, office 56 Goerck street, corner Delancy street, New York.

Gas-House Tiles and Fire Brick of all shapes and sizes. Fire Mortar, Clay, and Sand articles of every description made to order at the shortest notice. B. Kreischer, M Mauker, A. Weber.

KENNEDY'S Method of Securing Iron Mouth Pieces to Clay Retorts.—The Retort is made in the usual form, but without any bolt-holes through the flange. An iron collar made in two pieces, is then placed around the Retort behind the flange, and bolted to the mouth-piece by bolts which pass just outside of the flange instead of passing through it. As each Retort costs about $30, and as the breaking out of the bolt-holes entirely ruins the whole Retort, the importance of this simple but valuable improvement will be readily appreciated.

By this improvement the mouth-piece is firmly attached to Clay Retorts in a simple and very substantial manner, the bolts passing from the yoke to the mouth-piece on the outside of the Retort. The yokes are furnished at a low price, ready to be put on. For Engravings, see American Gas-Light Journal for June, 1860, page 245. Address the Patentee,

JOHN P. KENNEDY, Trenton, N. J.

IRON RETORTS.

CELLULAR GAS-RETORTS. C. M. CRESSON'S CELLULAR GAS Retorts, Patented October 3d, 1854. Adapted to the manufacture of GAS from Rosin, Coal, Wood, &c., and now in use at the Philadelphia Gas Works. Patent Rights for sale. For information apply to HENRY S. HAGERT, Attorney for Patentee, S. E. cor of Walnut and Sixth streets, Philadelphia, Pa.

FOR SYMMES' PATENT RE- torts, Mouthpieces, &c. address—
ELLIMAN BROTHERS, 217 Pearl-st., New York.
MORRIS, TASKER & CO, Philadelphia.
HORATIO EAGLE, 126 Maiden Lane, N. Y.
Or H. K. SYMMES, Newton, Mass.
See Engravings in American Gas-Light Journal for July 1, 1860, page 280.

GAS, WATER FITTINGS, &C.

LANE & ANNIN, GAS, WATER and Steam Fittings,

88 JOHN-St., Cor. of GOLD,

— NEW-YORK.

Manufacturers of the best quality of all the varieties of Connections for Iron Pipes; both Malleable, Wrought and Cast Iron. Also Meter Cocks, Lamp Cocks, &c.

Also, sole manufacturers of a New Meter Cock, which connects with Lead Pipe, forming a perfect joint without solder, Also, a connection for Lead pipe, without the use of solder.

GALVANIZED FITTINGS FOR PLUMBERS.

Wrought Iron Pipe of best quality, for sale Orders solicited.

CONTRACTS MADE FOR HEATING BUILDINGS BY STEAM.

CARDS.

NATIONAL DIRECTORY

OF

Gas & Steam Fitters & Plumbers.

ALBANY, N. Y.

WILLIAM MUNSIG,
623 Broadway.

ALEX. B. SHEPARD,
17 South Pearl St.

BALTIMORE, MD.

BLAIR & CO.,
366 W. Baltm'e St.

GRATTAN & EVANS,
8 North St.

J. H. McCALL & CO.,
15 W. Fayette St.

JOHN RICHARDS,
274 W. Baltm'e St.

BOSTON, MASS.

J. KENNEDY,
45 Maverick Sq.

W. WILTSHIRE,
46 Devonshire St.

N. P. WOODMAN,
12 Haverhill St.

J. B. WRIGHT,
33 Devonshire St.

CINCINNATI, O.

BAKER & VON FUHL,
64 Fourth St.

NEW YORK.

JAMES HELME
58 East 13th St.

WM. TOWERS,
21 Carmine St.

GEO. C. ELLISON,
859 Broadway.

B. M. JOHNSON,
111 East 18th St.

LOCKE & CRAIGIE,
12 East 20th St.

McKENZIE & O'HARA,
336 Fourth St.

ANTHONY KENDALL,
358 W. 36th St.

DAVIS B. LANE,
167 William St.

F. B. LANGWITH,
62 White St.

FRANCIS MATTHEWS,
47 Ann Street.

CHAS. F. MERRITT,
156 Seventh Ave.

WM. PALMER,
408 Eighth Ave.

GEORGE E. PARKER,
156 Seventh Ave.

DAVID REA,
48 Cortlandt St.

PORTABLE GAS-WORKS.

THE AUBIN GAS-WORKS CO., No. 44 State street, Albany, N. Y., will refer parties wanting Gas-Works for Villages to seventeen of their Village Works now in operation in the United States and the Canadas in *every one of which the profits of the company are ten per cent. and upwards, and yet good gas is furnished.* Agents wanted to extend the sale of the Aubin Portable Gas Stove for dwellings, factories, &c., which will make 1000 feet of gas in five hours, and with greater simplicity, safety and economy, than any other known apparatus.

BUTLER'S PATENT PORTABLE ROSIN GAS-WORKS,

FOR

DWELLINGS, CHURCHES, COUNTRY VILLAGES

As well as for Consumers in Large Cities.

JOHN BUTLER,
No. 112 Fulton-st. and 15 Henry-st.,
Brooklyn, N. Y.

FOR LIGHTING RAILROAD CARS and STEAMBOATS WITH GAS.

The whole process of Filling the Gas-Holders of a Railway Train, requires but Three Minutes.

Apply to the
NEW YORK CAR & STEAMBOAT GAS CO.,
No. 117 Fulton-st., N. Y.

C. R. WOODWORTH,
Manufacturer of
PORTABLE GAS WORKS,
74 WALL STREET, New York City.

PORTABLE GAS WORKS.—S. T. McDougall's Patent Portable Gas Works, for making Gas from Rosin, Rosin Oil, Coal Oil, Naptha, Grease, etc. These Works combine the latest improvements in gas making, and are guaranteed to be superior to any in market. They are made of all sizes, suitable for either country or city use. No county house is complete without its Gas Works. Gas Stoves of every description on hand and made to order. For sale by S. T. McDougall, 170 Center Street, New York.

Agents wanted in other cities to sell rights or machines.

GAS FOR THE COUNTRY.—C. Wooster, Manufacturer of Improved Portable Gas-Machines, for Villages, Public Institutions, Churches, Hotels, Railroad Depots, Factories, Mills, Machine-Shops, Plantation Dwellings, &c. Office, 256 Canal street, near Broadway.

This Machine has been in successful operation for years, in many of the best residences and factories in the country, and for simplicity of construction, ease of management and economy of light produced, possess a vantages over all other machines for the purpose now in use. It is adapted to the making of Gas from Crude Rosin or Rosin-Oil, producing a Gas of twice the illuminating power of Coal-Gas, at about one half the price usually charged for that gas.

Every Machine is sold under a strict guarantee to operate according to representation, and no payment required until the fact is demonstrated by actual use.

For further particulars, and descriptive pamphlet containing references to numerous parties now using the apparatus, address

C WOOSTER,
No. 256 Canal-st., near Broadway, N. Y.

For Engravings, see American Gas-Light Journal, for June, 1860, page 245.

☞ Responsible Agents wanted, with whom liberal arrangements will be made.

APPLETON'S IMPROVED GAS-Works, for Factories, Hotels, Dwellings, and Towns. The most simple and economical works in use, furnishing a superior light to coal gas at a cost of one half a cent per burner per hour. It does not injure trees, or plate, and is not affected by cold. For Circular and Terms apply to APPLETON & GRAHAM,
56 Washington street, Boston.

For Engravings, see American Gas-Light Journal for April, 1860, page 213

ROSIN GAS-WORKS, for Factories, Hotels, and Public Buildings. These works may be seen in operation at the Berkshire Woolen Mills, Great Barrington, Mass.; Manchester Mills, Manchester, Ct.; A. A. Van Alen & Co's. Factories, Stuyvesant Falls, N.Y., and many other places JAMES O MORSE & CO.,
76 John-st., New York.

MARSH'S PATENT ROSIN or Sun-Light Gas-Works, for Private Dwellings, Hotels, Factories, Railway stations, Sugar-Houses, Towns, &c. By the peculiar construction of the Retorts, the largest amount of decomposing surface is obtained in the smallest space. 2d. Gas is manufactured from crude rosin, without the least deposit of carbonaceous matter in the retorts or pipes: thus enabling them to be operated continuously, generating rapidly the best and cheapest illuminating gas obtained from this material. ALFRED MARSH & CO.,
241 Broadway New York.

GAS-METER FLUID.

FLUID for GAS METERS.—The undersigned is prepared to furnish the Glycerine meter fluid in quantities to suit purchasers: *it does not evaporate, can be made to stand any degree of cold liable to occur in this country or in Canada, and does not corrode the metals of the meter. It has been in use successfully for the last three years.*

For particulars, references, &c., address the manufacturer. HENRY BOWER,
Box 868, Philadelphia, Pa.

IRON FOUNDRIES.

S. V. Merrick, J. Vaughan Merrick,
W. H. Merrick.

SOUTHWARK FOUNDRY,
Philadelphia.

MERRICK & SONS, Engineers, manufacturers of every description of Gas Machinery.

Retorts, Bench Castings, Condensers, Washers, Scrubbers, Wet or Dry Lime Purifiers, Coke Wagons, Fire Tools, Wrought Iron Grate Bars, Gasholders, either Telescopic or Single, with Suspension Frames complete; Wrought Iron Roof Frames, for Iron or Slate; Stop Cocks, Exhausters, Steam Pumps, Boilers and Tanks, Steam or Hand Air Pumps for proving Street Mains, Centre Seals, Governors, Wrought or Cast-Iron Lime Sieves for Purifiers, Purifier Hoisting Machines, &c., &c.

Address— MERRICK & SONS,
5th and Washington Streets, Philadelphia.

MORRIS, TASKER & CO.,
PASCAL IRON WORKS,
[ESTABLISHED 1821]

Philadelphia, manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap Welded Boiler Flues,

Galvanized Wrought Iron Tubes,

ARTESIAN WELL PIPES,

of Wrought or Cast Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal gas works; Cast Iron Street Mains, Sends, Branches, Drips, &c.

Gas and Steam Fitters' Tools, &c.

Stephen Morris, Chas. Wheeler,
Thomas S. Tasker, Stephen P. M. Tasker.

BERGEN IRON WORKS.
Established 1833.

R. A. BRICK, Manufacturer of Cast-Iron Water and Gas Pipes. Retorts, Pipes, &c., always on hand, Office 109, Leonard street, New York.

OREGON FOUNDRY, Nos. 740, 742, 744 Greenwich street, New York.

HERRING & FLOYD, proprietors, manufacture Gas Compensators of all sizes, Self-Acting Valves, Exhausters upon an improved plan, costing less than half those of English manufacture, also castings of every description for Gas and Water-Works.

Herring & Floyd offer for sale Sabbaton's Patent Screening Shovels for coke and coals, made of malleable iron, of all sizes; Sabbaton's Patent Improved Cast Iron Furnace Frame and Door, arranged to protect the iron work of the door and frame from direct contact with the fire; also Floyd's Patent Malleable Iron Retort Covers, only quarter of an inch thick, but of convex form, and of great strength, as is attested by certificates from several of the leading Gas-works in America. For engravings of all the above patents see American Gas Light Journal for October, 1859, pages 65 and 71.

Samples of the above castings can be seen at the Rooms of the American Gas-Light Journal.

COLWELL & CO., Manufacturers of Pig Iron and Cast Iron Gas and Water Pipes, No. 207 North Water street and 206 North Wharves, Philadelphia.

STEPHEN COLWELL, W. DWIGHT BELL,
THEO. TREWENDT, SAMUEL FULTON.

TRANER & MERCER, 117 North Water street, and 124 North wharves, Philadelphia, Agents for FLORENCE & MERCER FOUNDRIES, ELK STREET IRON WORKS

Cast Iron Street Mains; *Bends, Branches, Chemical Retorts, and all kinds of Castings for* Gas-works, either Coal or Rosin Works. Sheet Iron for Gasometers *cut and punched to order.* Boiler Iron *of all descriptions.* Russia Sheet Iron, Tin Plates, Block Tin, Copper, Pig Lead, Spelter, and Metals generally.

GREENE ST. IRON FOUNDRY and Machine Shop, 37 to 43 Greene street, (Office, No. 39) near Grand, New York.

Cast Iron Soil and Drain Pipe, Tees, Bends, &c.
A. &. E. B. BRADY.

BUILDERS OF GAS-WORKS.

WATERHOUSE & BOWES, Raleigh, N. C. Builders of Gas-Works in Southern States. The following Gas works have been built by them, and are their references.

Charlotte, N. C.	Jacksonville, Fla.
Raleigh, N. C.	Fayetteville, N. C.
Salisbury, N. C.	Staunton, Va.
Yorkville, S. C.	Greenville, S. C.
Waverly, Miss.	

DIMMOCK, DWIGHT & CO., Engineers and Contractors for the erection of Coal Gas-Works. Offices 135 and 137 William street, New York city; and No. 2 Elm street, Springfield, Mass.

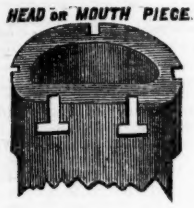
REFERENCES BY PERMISSION:

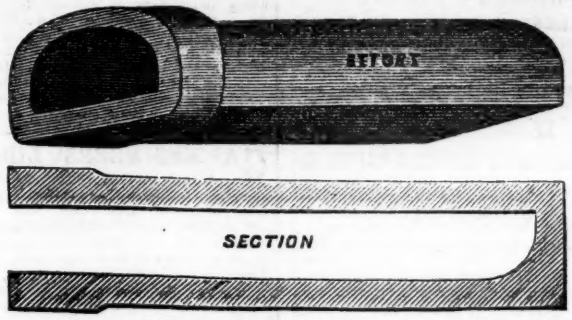
George D. Morgan, Esq., New York.
Aaron Claflin, Esq., "
A. B. Wood, Esq., "
George Bliss, Esq., N. Y., Pres. M. S. & N. I. R. R. Co
Geo. M. Atwater, Esq., Springfield, Mass.
Jas. D. Brewer, Esq., Pres. Springfield Gas Co.,
John I. Baker, Esq., Pres Beverly Gas Co.,
Henry E. Russell, Esq., Pres. N. Britain Gas Co.,
J. Dunham, Esq., Pres. Norwich, Ct. Gas Co.,
W. C. Street, Esq., Sec. Norwalk Ct. Gas Co.

STEPHEN SCAMMON,
Gas Engineer and Contractor for the erection of Gas-Works; also, dealer in Cast and Wrought Iron Pipe for Steam, Water and Gas, No. 61 Broadway, New York.

KING BROTHERS,

STOURBRIDGE, ENGLAND, FIRE-BRICK AND RETORT WORKS.





KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning thus rendering them

FREE FROM CRACKS AND CORRECT IN FORM.

By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carboniz

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABBITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

EVERY RETORT AND BRICK IS BRANDED "KING BROTHERS, STOURBRIDGE."

HARRIS & PEARSON,

PROPRIETORS OF

BEST GLASS-HOUSE POT, AND CRUCIBLE CLAY.

Manufacturers of Fire-Bricks, Gas-Retorts, and Glass-House Furnace-Bricks of every description.

AMBLECOTE FIRE-CLAY AND BRICK WORKS, STOURBRIDGE, ENGLAND.

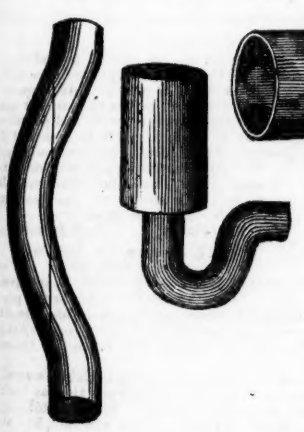
CODE, HOPPER & GRATZ,

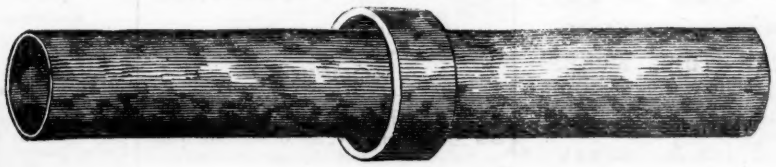
1500, 1502 and 1504 FILBERT-St., PHILADELPHIA.

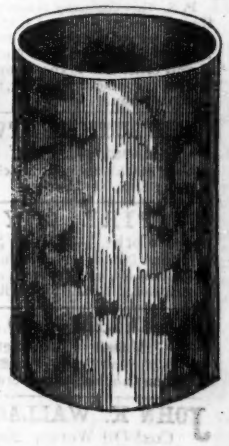
MANUFACTURERS OF

Pressure Registers, Pressure Indicators, Pressure Gauges, Photometers, Governors, Station Meters, Customer Meters, (Wet and Dry,) Experimental Meters, (Wet and Dry,) Show Meters, (Wet and Dry,) Meter Provers, Centre Seals, &c.

The high reputation which we have enjoyed for more than twenty-two years, and the fact that we have manufactured a greater number of Gas-Meters than all other manufacturers in this country combined, must present itself as a security to parties desirous of securing the most reliable instruments. Having completed a most extensiv addition to our Factory, and added many important improvements to our machinery, we are enabled to fill orders entrusted to us with dispatch, and in all cases *Guarante Entire satisfaction.* Our Patent Rotary-Valve Dry Gas-Meter is now used by upwards of Two Hundred Gas Companies, giving general satisfaction; we therefore recommend it, believing itsuperior to any other Dry Gas-Meter manufactured. All Meters tested separately by a sworn Meter-Inspector, and sealed when desired.







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MIDDLEBURY, SUMMIT CO., OHIO,

MANUFACTURER OE

SEWER-PIPES,

IN ALL ITS FORMS OF

Branches, Junctions, Curves, Elbows, Stench-Traps, &c., &c.

WARRANTED EQUAL TO THE BEST ENGLISH PIPE.

THE

STERLING GAS-REGULATOR

Improves the Light, and Saves a Large per centage of Gas.

MANUFACTURED BY THE

WHEELER & WILSON SEWING-MACHINE COMPANY.

It is well known that Printers require the best and most brilliant light. In proof of the superiority of these Machines over all others, the following New York establishments are using them, and testify to their excellence:—New-York Times, New-York Herald, New-York World, New-York Tribune, New-York Sun, Journal of Commerce, Courier & Enquirer, Evening Post, The Zeitung, Dispatch, Leader, Scientific American, Advertiser and Spectator, Independent, Daily News, Harper's Monthly and Weekly, Transcript, Mercury, Atlas, Life Illustrated, Albion, Spirit of the Times, AMERICAN GAS-LIGHT JOURNAL, Christian Enquirer, Churchman, Church Journal, Christian Advocate, Christian Ambassador, Christian Intelligencer, Observer, Sunday Times, Sunday Courier.

By order of the New York and Brooklyn Common Councils, these Regulators are now used in the City Halls, Police Stations, Markets, and other Public Buildings in both cities.

They are Warranted by the

WHEELER & WILSON SEWING-MACHINE CO.,

505 BROADWAY, NEW-YORK,

To keep in order, and always maintain the pressure of the Gas at the lowest point for a brilliant light, and economical combustion. They are so constructed that *under no circumstances can the Mercury get into the Meters, or in any way injure them.*

KIDDER'S

GAS-REGULATOR!!!

25 PER CENT. SAVED.

CERTIFIED BY SCIENTIFIC MEN TO BE THE

ONLY RELIABLE GAS-REGULATOR.

The undersigned Sole Agent for the sale of this valuable REGULATOR, is prepared to supply the Trade upon very favorable terms.

Agents Wanted in the Principal Cities and Towns throughout the United States and the British Possessions in North America.

As a Regulator and Economizer of Gas, it has received the highest testimonials. See advertisement in AMERICAN GAS-LIGHT JOURNAL, Vol. 2, No. 20, page 128.

HORATIO EAGLE, 126 Maiden Lane,
Between Pearl and Water streets.

COAL-OIL & CANDLES.

CANDLES FROM COAL.—Manufactured by the New York Paraffine Candle Co. Under Meucci's Patent. The above Company having recently made great improvement in their mode of manufacture, now offer to the public a Candle superior to any other in the market. They give a softer and more brilliant light and burn 6 hours to the pound longer than the best wax and sperm, and considering the strength of the light, are the most economical Candles in use.

CAUTION.

As unscrupulous persons are already offering imitations of these Candles, purchasers should bear in mind, that every box sold by this Company is stamped with the annexed trade mark, to counterfeit which is felony.

For sale by all first-class grocers, and to the trade by
WM. E. RIDER,
General Agent of the Company,
16 Beekman Street, New York.

STANDARD Photometric Candles.—Owing to a number of Applications made to me for information concerning the supply of the "Standard Sperm Candles," used in Photometries, I have obtained a supply, from which I can furnish those who require them with full directions for use.
T. W. PARMELE,
No. 4 Irving Place, New York.

TO CANDLE AND SOAP Makers.—Processes with drawings to manufacture every kind of candles and soaps by different processes: Candles by distillation, saponification, French candles, common candles, hard and soft soaps, palm soaps; processes to bleach palm oil and make candles out of it; purification of tallow; essays on greases and soaps. Address, Professor H. DUSSAUCE, Chemist, Lebanon, N. Y.

J. L. McREA, Dealer in Coal Oils and Lamps, Binnacle and Signal Light Oils, 139 Water street, New York.

Rosin Oil and Rosin.—For sale of our own manufacture a superior article of ROSIN OIL, for Gas purposes. Also Refined Oil. For shipment in secure iron-bound barrels, or by any single barrel.
Address MARYLAND GAS COMPANY, No. 6 Bank of Baltimore Building, Baltimore, Md.
P. S. This Company is also prepared to construct their superior Patented GAS WORKS of any capacity, from that required for a private dwelling, hotel, church, college or factory, to such as will supply cities and towns, complete in all their parts for the manufacture of GAS, from either Rosin Oil, Coal, or Rosin.

THE LUTHER ATWOOD OIL CO.—Manufacturers of Superior Illuminating, Machinery and Binacle Oils. Office, No. 34 Burling Slip, New York.

EMPIRE CITY CAMPHENE Works.—Aaron Seeley, Manufacturer and Distiller of camphene, alcohol, burning fluid, coal-oil, and dealer in naval stores, of every description. 32 and 34 Burling Slip, New York.

H. RYDER & CO., New Bedford, Mass.—Purchasers and Manufacturers of Semi-Crude Paraffine. Ryder's patent Paraffine Candles, manufactured and for sale.

JOHN K. WALLACE'S Keystone Coal Oil Works, No. 43 Haydock-st., East of 1017 North Front Street, Philadelphia. Dr. I. D. KNIGHT, Chemist. Constantly refining and for sale, Keystone burning oil from Cannel coal, Keystone machinery oil, from Cannel coal; Paraffine, Benzole and Naptha.

NEW-BEDFORD OIL CO.—Office foot of South [illegible], New-Bedford, manufacture coal-oil for illuminating and lubricating purposes, of the best quality.
ABRAHAM H. HOWLAND.
Our Coal-Oil will burn in all Kerosene Lamps

TO CONTRACTORS

TO GAS COMPANIES AND CONTRACTORS.—For Sale: Two sets Dry Lime Purifiers, 14 feet by 12 feet, 5 tiers of plates, 12 inch connections; and one Set Purifiers, 10 feet by 5 feet, 5 tiers of plates, 8 inch connections. A Station Meter, (square case) 8 feet front, 8 feet deep, and 7 feet high; registers 250,000 feet per diem. Also a quantity of Bench Castings, consisting of Sections of Hydraulic main, (D shaped pattern,) Stand, Bridge and Dip Pipes, together with a number of Composition-faced Slide Valves, various sizes, from 6 inches to 16 inches diameter.
Address the ENGINEER OF THE MANHATTAN GAS-LIGHT COMPANY, Foot of 18th-st., N. R., New-York.

GAS & WATER-PIPE.

PARIS'S PATENT
GLASS-ENAMELLED WROUGHT IRON TUBES.
PROSSER'S PATENT
LAP-WELDED IRON BOILER TUBES.
TUBES FOR ARTESIAN WELLS, CONVEYING STEAM OR WATER, SHAFTING, &c., SCREWED OR COUPLED TOGETHER, IN VARIOUS WAYS.
THOS. PROSSER & SON, 28 Platt-st. N. Y

CAST IRON WATER, GAS, DRAIN, AND HEATER PIPES, &c.,
COLUMBIAN IRON WORKS,
OFFICE, No. 46 NORTH SEVENTH STREET,
Below Arch street, Philadelphia.
THOS. M. ADAMS, Proprietor.

CAST AND WROUGHT IRON Pipe, Branches, Elbows, Sleeves, &c. Lamp-posts, Wrought iron Lanterns for Lamp-posts, Gas Retorts (clay or iron), Street Mains in 9 or 12 feet lengths. Sheet iron cut to pattern for Gas-holders. For sale by the manufacturers' Agent,
HENRY G. NICHOLS, 24 Pine-st., N. Y.

HUNTER, KELLER & CO., Manufacturers of
WROUGHT-IRON PIPES, AND FIXTURES
of all descriptions, for
STEAM, WATER AND GAS,
144 Centre street, New York.

TO GAS AND WATER COMPANIES:
The undersigned, Agent for Messrs. Thomas Edington & Sons, Phenix Foundry, Glasgow, Scotland, Is prepared to contract for all descriptions of Cast-iron Pipes of their manufacture.
About 6000 tons of these Pipes have lately been supplied to the Brooklyn Water-works, N. Y., and the Chief Engineer of the Works, A. P. Kirkwood, Esq., is ready to testify to their excellent quality.
ARCH'LD BAXTER, 90 Broad-st., N. Y.
Sole Agent For the United States and Canada.

R. D. WOOD & CO.,
MANUFACTURERS OF
CAST-IRON PIPE, RETORTS, &c.
Office, 400 Chestnut Street,
PHILADELPHIA.

GIRARD TUBE WORKS. Murphy & Allison, Proprietors. Wrought Iron Coke-Welded Tubes, for Gas, Water, Steam, &c. Wrought, Cast and Malleable Iron Fittings, Steam and Gas Cocks, Valves. Also, Galvanized Tubes and Fittings.
Office 1908 Market street, Philadelphia.

AMERICAN TUBE WORKS.—W. G. Smith & Co., Forty-sixth street, east of 10th Avenue, New York City. Manufacturers of
WELDED IRON PIPE,
for Steam or Gas, of all sizes, from 1-8th to 8 inches.

CAST-IRON PIPES.—EARL'S IRON WORKS, NEWARK, N. J., 91, 93, 95, 97 and 99 Chestnut street. Branch Office, 21 Centre street, New York.
The subscriber continues to manufacture Superior Cast-Iron Gas and Water Pipes, Branches, Bends, Angles, Bevel Hubs, Reduces, Sleeves, Drip Syphons, Plugs, Caps, Retorts, Bench Castings, and Castings in general, Particular attention paid to all Castings connected with Gas Works. E. B. EARL.

S. S. ASHCRAFT, Cincinnati, O., Manufacturer of Gas and Water-Pipes, with Branches of every description; Retorts for Gas and Oil Works; Gasholder Stands, Columns, &c.; Gas Purifiers, Condensers, and Gas Apparatus of all kinds; Foundry Work in general.
N. B.—A complete selection of Patterns on hand. Refer to any of the Gas Works in the Western and Southwestern States.
THEODORE SCOWDEN, Engineer, Louisville.
JOHN JEFFREY, Civil Engineer, Cincinnati.
JACOB HOUGHTON, Engineer, Detroit.

GAS-ENGINEERS.

C. N. TRUMP, Gas-Works Engineer, No. 56, North Seventh-street, Phila. Agent for the Aubin Gas-Works.
Gas-Works erected for Towns, Villages, Factories, and Dwellings.

JAMES RENWICK SMEDBERG, Consulting and Constructing GAS-ENGINEER. SAVANNAH, Geo.
REFERENCES:
CHARLES ROOME, Esq., Pres. Man. Gas Co., N. Y.
J. K. BRICK, Esq., Eng'r Brooklyn Gas Co., "
Messrs. ELLIMAN BROTHERS, New-York.
F. T. WILLIS, Esq., Pres. Savannah Gas Co.
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JOHN B. MURRAY, Prop. AM. GAS-LIGHT JOUR.

SCIENTIFIC BOOKS.

SCIENTIFIC BOOKS.—D. APPLETON & Co., 443 and 445 Broadway, have just published a Catalogue of their large assortment of Books (English and American) in every department of Science and Art, embracing a valuable collection of works on Geology, Chemistry, Mechanics, Engineering, the Naval and Military Sciences, and on Steam, Steam Engines, and Steam Navigation, etc., etc., etc., with the dates and prices of each work affixed.
Catalogues remitted to any address on receipt of six cents in P. O. stamps.

GAS ENGINEERS' LIBRARY.—A few works, indispensable to Engineers, Contractors and others engaged in the construction of Gas Works and manufacture of Gas, have been selected out of a large stock of chemical and other works, and are recommended to the attention of those interested.
AMERICAN GAS-LIGHT JOURNAL, Vol. 1, bound $5
Do. do., in numbers, per annum, $3
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LE GAZ. Paris, per annum, $3.50.
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PARNELL. Applied Chemistry in Manufactures. 2 vols. 8vo. $7.50.
PECKSTONE. Manufacture of Coal-Gas. 1 vol. $7.50
TAYLOR. Coal Fields of the World, with plates. A most useful and interesting work to gas makers, coal miners, &c. 1 vol. 4to. $6.00
URE. Dictionary of Arts, Manufactures, and Sciences. 4th ed. London. 2 vols. 8vo. $5.50
WILLIAMS. Treatise on the Combustion of Coal. 1 vol. 4to. London. $3.75.
For sale at the Rooms of the AMERICAN GAS-LIGHT JOURNAL, New-York.

COAL OIL.—A Practical treatise on Coal, Petroleum, and other distilled Oils, by Abraham Gesner. 8vo., illustrated. Cloth, $1 50.
Sent free by mail on receipt of the amount.
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440 Broadway, New York.
BAILLIERE BROTHERS keep always on hand a complete assortment of all new books on Chemistry and the Sciences.
Catalogues sent gratis on application.

ROOFING.

ROOFING SLATES of the Eagle Slate Company, are of superior quality, low cost, fire-proof, yield pure and untainted rain water, and last a lifetime. Builders address the agent of the Company.
G. FURMAN,
37 Cortlandt-st., N.Y.

PATENT ASPHALTE ROOFING and SHIP SHEATHING FELTS, the cheapest, best, and most durable ever offered to the public. Circulars, samples, &c., will be forwarded free. Agents wanted for city and towns. None genuine unless purchased of AARON A. DEGRAUW, 242 South street, our sole agent for the United States.
CROGGON & CO., London.

FINANCIAL.

GAS-LIGHT STOCKS FOR SALE. THREE HUNDRED THOUSAND DOLLARS of Stocks in various Gas-light Companies in the United States, paying from 6 to 12 per cent dividend, for sale by JOHN B. MURRAY, Rooms of the AMERICAN GAS-LIGHT JOURNAL, N. Y.

OHIO STATE AGENCY, No. 25 WILLIAM-ST., NEW-YORK, Dec. 12, 1860.

THE COMMISSIONERS OF THE SINKING FUND of the STATE of OHIO have withdrawn their advertisement inviting proposals for the State Loan to be opened on the 13th inst.
The General Assembly of the State will convene the first Monday in January next and will promptly designate the time at which payment will be made of the debt redeemable at the pleasure of the State, after the 31st instant, and make adequate provision therefor.
Until the redemption of the principal, after due notice of the time thereof shall have been given, interest will be paid semi-annually as heretofore.
R. W. TAYLOR, Auditor of State,
A. F. RUSSELL, Secretary of State,
C. P. WOLCOTT, Attorney General,
Commissioners of the Sinking Fund.

GASOMETERS.

GASOMETERS, RETORT-HOUSE ROOFS, WATER-TANKS,
PURIFYING-BOXES, COAL-CARS, COKE-BARROWS,
AND ALL KINDS OF
WROUGHT-IRON WORK FOR GAS AND WATER WORKS.
Manufactured by GEORGE W. KRAFT, Chestnut street wharf, West Philadelphia, Pa.

GEORGE STACEY, Cincinnati, O., Manufacturer of single and Telescopic Gasholders, Wrought-Iron Bridges, Girders, Joists and Stairways, Coke and Coal Wagons, Rakes, Screens, and other Gas-works tools, Slide and Cup Valves, Bolts, Nuts, Chisels, Ladles and other tools, Wrought-iron roofs, for Slate and Corrugated Iron, Gas Purifiers, Washers, Centre seal Valves and other Gas apparatus, Boiler-plate Retort Lids. Refer to—
Cincinnati Gas Light & Coke Co.
Nashville Gas-Light Co.
Springfield Gas-Light Co.
Columbus Gas-Light Co.
Cleveland Gas-Light Co.
Covington and Newport Gas Light Co.
Memphis Gas-Light Co.
Indianapolis Gas-Light and Coke Co.
James H. Caldwell, Esq., New Orleans.
John Jeffrey, Esq., Cincinnati.

POOLE & HUNT, Baltimore, Md., are prepared to execute orders for
GAS-HOLDERS,
IRON-ROOF FRAMING
And all other Descriptions of
Iron Work for Gas-Works, Water-Pipes and Heavy Castings and Machinery Generally.

ANTI-FREEZING APPARATUS

FREEZING OF GAS-PIPES.—Walton's Patent Anti-Freezing Apparatus illustrated by engravings, in the AMERICAN GAS-LIGHT JOURNAL, of Jan., 1860, page 141, is the most simple, durable and efficient of any known process.
According to Professor Faraday, the watery vapor contained in illuminating gas amounts to 0·0093 parts where the gas is at a temperature of 40°, or in other words, that there are 1, 7-10 *gills water in every* 1,000 *cubic feet of gas* at that temperature. It is the deposit of this water in the form of frost that closes the exposed pipes.
Walton's plan is, in a few words, to supply this water with a sufficient quantity of alcohol (98–100ths), the vapor of which will enable it to pass through the most exposed pipes, unaffected by frost. Experiments of three years prove that one gill of such alcohol will protect 1,000 feet of gas at any temperature. Private houses, Hotels and Gas-works, can be thus guarantied from frost by the use of Walton's Anti-Freezer, which consists of but two or three small castings, at the most trifling cost. It can be applied at Gas-works without altering any of the pipes; and the expense of labor and the alcohol will not exceed two cents per 1,000 feet of gas.
It can be seen in operation at the rooms of the AMERICAN GAS-LIGHT JOURNAL, where orders will be executed at once.

Read the Following Testimonials:

GAS-WORKS, CINCINNATI, O., 24th May, 1858.
MR. JOHN WALTON, Louisville, Ky.:
DEAR SIR,—At an earlier date, I intended to have written you the result of my experience during last winter, in regard to your patented apparatus to prevent the freezing of gas in pipes. I am quite convinced that both in theory and practice your apparatus is correct, and in no case will it fail to prevent the freezing in pipes of our illuminating carburretted hydrogen gas, provided attention is paid to renew the alcohol often enough in proportion to the amount of gas passing through the anti-freezing apparatus.
Yours truly, JOHN JEFFREY.

OFFICE LOUISVILLE, KY., GAS CO., March 30th, 1860.
In the winter of 1856, this Gas Company first applied John Walton's patent method for the prevention of Frost in Service Pipes,—to this date we have used it with perfect success. *This Company have Purchased the Right to this Patent for Louisville, Kentucky.*
The application of a vessel, containing a small quantity of alcohol, placed between the gas main and an open area connected with a building, through which the service pipe was laid, has always prevented the freezing or stoppage of the service pipe, although the temperature may have ranged from the freezing point to several degrees below zero.
As the alcohol absorbs from the gas any vapor of the water that may be passing off with it, after passing the vessel containing alcohol, there remains in the gas nothing that can freeze or close the pipe. *This simple application, we have proved to be an effectual safeguard against the closing of gas pipes with frost.*
ROBERT G. COURTENAY, President.

WATER-GAS WORKS.

WATER-GAS.—APPLETON & GRAHAM,
AGENTS FOR THE
NEW ENGLAND WATER-GAS COMPANY,
UNDER THE SANDERS PATENT,
Are prepared to give estimates for Works, and guarantee the cost of Gas not to exceed One Dollar per 1000 cubic feet.
☞ Coal or Rosin Gas-Works altered at small expense.
A. & G. continue as heretofore to erect their improved Rosin and Rosin-Oil Works for Private Dwellings, Factories, &c. For further particulars apply at 56 WASHINGTON-ST., BOSTON.